THE GAS JOURNAL

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A Glance at the Contents—

Coke Oven Managers' Association.

Published to-day is the Presidential Address of Mr. G. T. Purves before the Coke Oven Managers' Association at their General Meeting in London on Oct. 20. [p. 327.]

Gas Exhibition at Dunfermline.

A successful gas exhibition was held recently in Dunfermline under the auspices of the Corporation Gas Department, and a photograph shows the stand of Messrs. R. & A. Main, Ltd. [p. 315.]

" Daylight Blue " Gas Lighting.

An illustration is given of a night photograph of a recent window display in the Greenock Gas Showrooms, which is possibly one of the first to be taken by " daylight blue " gas light. [p. 312.]

Glover-West Verticals at Helensburgh.

A description of the new Glover-West carbonizing plant at the Helensburgh Gas-Works is given, together with some notes on the earlier installation—one of the first of its kind to be erected. The article is by Mr. D. Fulton, Engineer and Manager of the Helensburgh Gas Undertaking, and is extracted from " West's Gas." [p. 316.]

Industrial Gas Laboratory at Cardiff.

Facts relating to the experiments in Birmingham on the possibilities of gas for internal combustion engines were revealed by Dr. C. M. Walter, speaking at a luncheon given at the Park Hotel, Cardiff, on Oct. 27, in connection with an inspection of the Industrial Gas Laboratory and Showrooms of the Cardiff Gas Light and Coke Company by gas undertakings in Wales and Monmouthshire. [p. 314.]

Secretary and Accountant Required.

Applications are invited for the position of Secretary and Accountant of the Jersey Gas Light Company, Ltd. Candidates must not exceed 40 years of age, and the commencing salary offered is £400 per annum. [p. 337.]

Woodall-Duckham Verticals at Grimsby.

An important development of the Grimsby Gas Undertaking was completed on Oct. 25, when the Mayor of Grimsby (Mr. C. W. Dixon) set in motion a new Woodall-Duckham vertical retort installation at the Catherine Street Works of the Great Grimsby Gas Company. [p. 318.]

Eastern Counties Association.

The half-yearly meeting of the Eastern Counties Gas Managers' Association was held in the Board Room of the National Gas Council, 28, Grosvenor Gardens, S.W. 1—Mr. P. D. Walmsley, the President, in the chair. A discussion on the subject of diaphragm governors took place. [p. 329.]

Carbonizing Plant at Dalmarnock.

The opening meeting of the 29th session of the Scottish Junior Gas Association (Western District) was held in Glasgow on Oct. 8, when Mr. S. McGown delivered his Presidential Address, in which he deals with the carbonizing plant at the Dalmarnock Gas-Works. [p. 331.]

Midland Association.

The Autumn General Meeting of the Midland Association of Gas Engineers and Managers took place in the Imperial Hotel, Birmingham, last Thursday—Mr. E. B. Tomlinson, of Birmingham, presiding. Mr. Arthur Roberts read a paper on the subject of " Three Years of Vertical Retort Practice at Hereford." [p. 321.]

Forthcoming Engagements

Nov. 3.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council Meeting, 11.30 a.m.

Nov. 3.—SOCIETY OF BRITISH GAS INDUSTRIES.—Autumn General Meeting, Hotel Metropole, London.

Nov. 4.—GAS COMPANIES PROTECTION ASSOCIATION.—Meeting of Committee, 5, Victoria Street, S.W. 1, 2.30 p.m.

Nov. 5.—MANCHESTER AND DISTRICT JUNIOR ASSOCIATION.—Meeting at Stockport. Paper by Mr. A. Langley.

Nov. 5.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Visit to Beckton Coke Oven Plant.

Nov. 5.—SCOTTISH JUNIOR ASSOCIATION.—Joint Meeting in Edinburgh. Paper by Mr. C. S. Poulson, of West's Gas Improvement Co., Ltd.

Nov. 7.—MANCHESTER AND DISTRICT JUNIOR ASSOCIATION.—Visit to Lancashire Steel Corporation, Irlam. Paper by Mr. W. B. Payne.

Nov. 7.—INSTITUTION OF GAS ENGINEERS.—Meeting of Joint Lighting Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 8.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Council, 28, Grosvenor Gardens, S.W. 1.

Nov. 8.—FEDERATION OF GAS EMPLOYERS.—Meeting of Central Committee, 28, Grosvenor Gardens, S.W. 1.

Nov. 8.—INSTITUTION OF GAS ENGINEERS.—Meetings of Industrial Gas Committee, 11 a.m.; Education Executive Committee, 4 p.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 9.—INSTITUTION OF GAS ENGINEERS.—Meeting of Gasholder Sub-Committee, 10.30 a.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 10.—MIDLAND JUNIOR ASSOCIATION.—Address by Prof. F. W. Burstall.

Nov. 12.—WESTERN JUNIOR ASSOCIATION.—Meeting in Bristol. Address by Mr. R. E. Gibson.

Nov. 16.—B.C.G.A.—Meetings of Executive Committee, 11.30 a.m.; General Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 16.—SOUTHERN ASSOCIATION.—General Meeting, Hotel Metropole, London, W.C., at 2.15.

Nov. 18.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Annual Dinner and Dance, Florence Restaurant, W. 1.

Nov. 19.—SCOTTISH JUNIOR ASSOCIATION (WESTERN DISTRICT).—Visit to Glenboig Fireclay Works.

Nov. 29.—INSTITUTION OF GAS ENGINEERS.—Meeting of Gas Appliances Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 29.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, at 2.30 p.m.

Dec. 12.—INSTITUTION OF GAS ENGINEERS.—Meetings of Joint Research Committee, 10 a.m.; Liquor Effluents and Ammonia Sub-Committee, 12 noon; Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee of the Council, 3 p.m.; Purifiers Sub-Committee, 5 p.m., 28, Grosvenor Gardens, S.W. 1.

Dec. 13.—INSTITUTION OF GAS ENGINEERS.—Meetings of Council, 10 a.m.; Education Executive Committee, 4 p.m., 28, Grosvenor Gardens, S.W. 1.

EDITORIAL NOTES

The Coke Oven Industry

IN the last calendar year, for every 100 ingot tons produced in this country 70 tons of steel were imported. It is to " protection " that Mr. G. T. Purves, in his Presidential Address to the Coke Oven Managers' Association, in part pins his faith in the ultimate recovery of the iron and steel industry of Great Britain, and hence the recovery of the coke oven industry. The latter industry can produce a good coke; in this respect as in many others there has been great improvement during the past ten years. At one iron works, for example, the average test of six months' deliveries of coke from some twenty Midland coking plants was, in 1920, moisture 8·9%, ash 11·6%; 1932, moisture 3·4%, ash 9·0%. Figures for the coke from individual plants are even more striking. Though all the factors which make a coke pre-eminently suitable for blast furnaces are not clearly defined by the ironmasters, the demand is for dry low-ash cokes uniform in size and having a high degree of hardness as measured by, say, its shatter index. These characteristics all favour the narrow oven and fast coking times; and Mr. Purves emphasizes that, though a number of such coking plants have been erected in this country, many more will be required to replace the existing wide oven plants if the coming demand for high-quality coke is to be met. And he goes on to say that, " since the production of the higher grade cokes must entail greater cost in their manufacture, it is clear that failure to arrive at a quality basis of pricing is a factor which will tend to hold back the proper development of the coking industry. If we had agreement to value coke on a quality basis, there would be more inducement to install modern equipment and make the higher quality demanded." Another essential to the future well-being of the coke oven industry is an alteration of the terms of the Coal Mines Act, 1930, which govern the provision of coking fuel.

The address is published in full in this issue of the " JOURNAL," and will prove of much interest to the Gas Industry. In particular our readers will note Mr. Purves' observations on surplus gas disposal and on benzole recovery. Regarding the latter, he observes that the revenue which has been derived from motor benzole during the last year or two has kept the coking industry alive. He believes, however, that if the retail price of imported motor spirit be stabilized at anything like the present value, we may anticipate big developments in synthetic motor fuel production. This is most desirable; at the same time, with the influence of synthetic ammonia in mind, Mr. Purves speaks of a possible reaction against the revenue from motor benzole. This, however, is looking far ahead. As to surplus gas disposal, it is shown that cold coke oven gas at the open hearth furnace is worth 9·4d. per 1000 c.ft., the basis of this calculation being the cost of available heat in hot producer gas at the furnace. The author recently made a comparative heat balance of the open hearth furnace working on hot producer gas and a " not too modern " coke oven battery working on cold coke oven gas, and found the utilizable heat ratio to be 1·4 to 1 in favour of the cold gas—a ratio confirmed by Dr. Lent, who, in the " JOURNAL " for June 1 last, stated that in practice the efficiency of the open hearth furnace is 40% higher with coke oven gas than with producer gas. The importance of the question of using coke oven gas for the open hearth furnace is best indicated by saying that if all such furnaces in South Yorkshire desired to burn coke oven gas there would not be sufficient surplus available. And there are many other uses to which coke oven gas can be put on steel works. Mr. Purves leans towards high supply pressures, and explains that his own Company, the United Steel Companies, Ltd., have decided that, to give the best results, the service pressure must be several pounds per square inch. There are, of course, particular circumstances which influence the Company in arriving at this decision.

Governors

FOR long we have laid emphasis on the effect of maintenance of constant pressure on the efficient working of gas appliances. It is some years since we called attention to a highly interesting series of investigations on a natural-draught furnace which demonstrated that alterations in pressure from 45 tenths to 5 tenths, with constant gas rate, did not affect the efficiency of the furnace. In other words, efficiency depends not so much on pressure as upon the maintenance of a constant and desirable gas rate. The reason why pressure variations are so important is that they alter the gas rate. The moral is that natural-draught furnaces will for most purposes function efficiently and wholly satisfactorily at comparatively low pressures, but that whatever pressure is employed must be uniform. For each appliance there is a definite optimum gas rate; hence the need for governors. What we have said about furnaces applies to other gas-using apparatus, and in particular to lighting appliances. Variation in pressure at a lighting burner is at once discernible; and unless we provide uniform pressure at the burner we cannot hope to retain the lighting load. We are aware of the great improvements which have been effected in district pressures during the past decade, but much remains to be done, and certainly the gas lighting load presents a case for governors. Our idea is that the use of governors is bound to develop. Particularly in new districts, with scattered houses, we could utilize our mains and services more effectively and probably achieve our object of uniform pressure at appliances at a lower cost if we resorted more to the use of governors at consumers' premises.

The Gas Industry simply could not have progressed without governors both at the manufacturing station and on the district, and the future of gas in both the home and industry is largely bound up with governing. The latest application of gas at extremely high pressures for motor traction work could not hope for success without an efficient governor—an instrument which will without fail reduce a pressure of, say, 3000 lbs. per sq. in. to a vacuum of a few inches. And it is fortunate that the manufacturers of governors have such a wealth of experience and specialized knowledge at their command. An indication of this knowledge is contained in a paper read by Mr. C. Bryan Donkin at a meeting of the Eastern Counties Gas Managers' Association last week. The contribution shows that the designing of a governor is not as simple a matter as at first sight may appear, and it provides reasons for the various designs of governor to meet different conditions. The author suggests that the ideal system would be for every piece of gas apparatus to have its own governor, which would be set to the most efficient pressure. In the meantime the governor at the service or meter gives good results. " The cost of installing such governors is often urged against such a scheme, but this cost need not be great, and the satisfactory service given will often retain a consumer who otherwise might go over to electricity." Mr. Donkin deals briefly with the various forms of governor for both low and high pressures, including the automatic by-pass used in conjunction with fan boosters fixed on a district main. Fan boosters have recently been installed on the outlet of purifiers in order to relieve back pressure. In this case a diaphragm governor is arranged on the booster inlet to maintain a pressure of, say, 5 tenths on the purifiers, the fans running at a constant speed independent of the volume passing. The same

arrangement can be adopted to prevent the holder crown being drawn in by boosting fans.

In the year 1932 it may seem out of place to refer to what a governor does; but we have plenty of evidence to prove that there are many people, some of them in the Gas Industry, who harbour misconceptions as to the functioning of a governor. The idea persists that a service or appliance governor is an instrument designed to prevent wastage of gas, whereas the chief function of such a governor is to enable the gas-consuming appliance to develop its full heating capacity at periods of peak loads.

Efficiency in Carbonizing

SHORT papers on practical experience of carbonizing systems are always welcome; and the paper entitled "Three Years of Vertical Retort Practice at Hereford" which Mr. Arthur Roberts, Engineer and General Manager to the Corporation Gas Department, read at a meeting of the Midland Association of Gas Engineers and Managers last Thursday will be found useful to those in charge of similar plant. The installation at Hereford consists of twelve 62-in. Woodall-Duckham continuous verticals, built of silica and employing downward heating. Modern improvements are incorporated, the producers being so arranged, for example, that either one may be shut down without interfering in any way with the working of the other. Also, they are fitted with doors, so that they can be worked under pressure if desirable for the use of inferior fuel. One gathers that the author has no need to work his plant to full capacity, for he has reduced the working temperatures of the retorts from 1340° C. at the top and 1175° C. at the bottom to 1300° C. and 1080° C. respectively. This reduction in temperature has been made to increase the life of the setting, but is the life of modern high-class silica retorts dependent on the temperature at which they are worked practically? Also, there is the point of how the lowering of carbonizing temperature affects the efficiency of the steaming process.

Included in the paper are carbonizing results working on a large number of fuels from various coalfields, and the figures given will prove of much interest to many of our readers. It will be noted that the mixture of coals given in the guarantee test was taken from the fuel in use in the horizontal retorts, but experience has shown that the best yields are given by Yorkshire washed double nuts with a small proportion of Derbyshire washed nuts. Interest also attaches to the table setting out the comparative working costs of the horizontal retort installation and the vertical setting. The figures, as is so often the case, must be viewed with the qualification that the comparison is between new verticals and horizontals which had been in use for a considerable time. Bearing this in mind, the fact remains that gas-making wages costs with the verticals last year were less than two-thirds those of pre-war with horizontals; while the figures under this heading for 1929 (the last year for horizontals) and for 1931 are 1·11d. and 0·42d. respectively. The maintenance of works and plant per therm of gas sold, as is to be expected, shows a decrease—from 1·20d. in 1929 to 0·82d. in 1931. Comparing the two years, the total reduction in working costs is 1·48d. per therm.

Better Lighting Campaigns

WITH the dark evenings once more upon us, we must all, in one place or another, be reminded painfully of the need for better lighting. Gas consumers have now at their disposal fittings to meet all reasonable requirements, and we should see to it that the fullest advantage is taken of the facilities offered. Gas lighting is good both for the eyes and for the pocket; it is usually readily available, save on certain council house estates; and for the modest home it possesses a substantial additional advantage in that it gives off a certain amount of welcome warmth. This is a feature of which advantage is sometimes not taken to the extent that it should be, when enumerating the points in favour of gas. At any rate, in early autumn and in early spring the cosy and comfortable gas lighting may easily save a fire for warming the room which would be necessary with another form of illumination which may be nameless. So we would say to those on the distribution side: "Keep your attention on the lighting load."

Our electrical friends have been organizing a Better Lighting for Hotels Campaign, for which there is ample scope—assuming the accuracy of the statement that there are at the present time some 9000 hotels in the United Kingdom. A recent survey covering nearly 400 of these hotels, of various classes, revealed the fact that on an average in only one out of every ten bedrooms could the light be controlled from the bed; only one hotel in three provided a light by the mirror; and even in respect of the use of illuminated directional signs in the corridors the percentage of cases where these were provided was very small. If this is the state of lighting in hotels "of various classes"—establishments engaged in business of a highly competitive nature—we venture to say that the homes of the people are not likely to yield less fruitful results to gas undertakings seeking strenuously to improve and modernize the lighting.

Extended Protection for the Iron and Steel Industry

WITH the coal industry so much in the public eye, it seems appropriate that the position of another nearly connected industry should be discussed. Sir Hugo Hirst's Presidential Address to the Institute of Fuel, which was referred to in last week's "JOURNAL," was followed in the evening by the annual dinner, one of the principal speakers at which was Mr. Charles M. Schwab, of the Bethlehem Steel Corporation. Every word that Mr. Schwab had to say was followed with the closest attention by his large audience, who evidently attached the importance deserved to his remarks, which were born of a vast experience accumulated through business operations upon a gigantic scale. Mr. Schwab measures in millions of tons, and all the millions that have been recorded in the past he confidently expects to be exceeded in the future.

Mr. Schwab sees the United States and this country inter-dependent for prosperity. Broadly this may be so; but we must each of us look after our own interests. The policy of other countries being as it is, it has been decided that this country's industries must be protected, and accordingly this policy has been extended to the iron and steel industry. That step was taken after due consideration, and now a further report of the Import Duties Advisory Committee with regard to the iron and steel duties has been issued, accompanied by a Treasury Order for the continuance for a period of two years from October of the duties now in force. The continuance, however, is to be subject to satisfactory progress being made in the preparation of a scheme of re-organization, and in putting the approved scheme into force. To the National Committee for the Iron and Steel Industry has been delegated the task of "working out on broad general lines, with such modifications as may be appropriate to the special conditions of particular districts, schemes of re-organization and development which, with the assistance of an adequate scale of tariff protection, may conduce to the restoration of its efficiency and prosperity." Regional Committees have been appointed to consider the problems arising in each of the chief producing areas, and the general position has been reviewed. As a result, we have the first report of the Committee, which sets forth that the objects they have placed before themselves are:

(1) To secure that all the iron and steel requirements of the nation, both in semi-finished and finished form, including its manufactures of steel products for export, are met to the maximum possible extent by its own iron and steel industry.

(2) To carry through such re-organizations and adjustments in the industry as will enable such requirements to be met at the lowest possible cost and with the maximum resultant expansion of the trade of the country.

(3) To stop wasteful competition between manufacturers in this country.

This is an extensive programme, and one can hardly

quarrel with the Committee over the feeling they express in their report that " some greater measure of assurance in regard to tariff protection is an essential condition of progress." To enable the people to " get down to business again," what the world is perhaps in greater need of than anything else is increased stability. Before evolving big schemes of development industrialists, quite reasonably, require to know where they stand.

PERSONAL

The Buckhaven and Leven Gas Board have appointed Mr. ATHOLL BROWN, of Crieff, as Technical Assistant at Leven Gas-Works.

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Mr. F. L. BAKER, District Superintendent to the Chelmsford Corporation Gas Department has been appointed Outdoor Distribution Superintendent to the Tendring Hundreds Gas and Water Company.

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At a Board meeting of Messrs. Worthington-Simpson, Ltd., held on Oct. 12, Mr. A. BURGESS, General Sales Manager, was elected an additional Director. Mr. Burgess has previously represented the Worthington interests in Brussels, Paris, Buenos Aires, &c.

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Mr. ERIC WILLIAMS, of Ormskirk, has been appointed Assistant Engineer and Manager to the Slough Gas and Coke Company, and took up his new duties on Nov. 1. Mr. Williams, who is an Associate Member of the Institution of Gas Engineers, has been Assistant Engineer to the Ormskirk District Gas Company for several years.

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Mr. J. P. THOMPSON, Engineer and Manager to the Barnoldswick Gas Undertaking since 1928, and who on Oct. 26 was appointed Engineer and Manager to the Newbury (Berkshire) Corporation Gas Department, is only 33 years of age. An old boy of Skipton Grammar School, he was trained in gas practice under his father, the late Mr. W. W. Thompson, who was Engineer and Manager at Barnoldswick for 24 years. In 1916 he won the City and Guilds of London bronze medal in Gas Supply and the following year secured the second prize for all England in the Final Grade. Before taking charge at Barnoldswick he was Deputy-Engineer at Colne for four years. He was appointed to Newbury out of 126 applicants, and takes up duty on Dec. 1.

OBITUARY

DR. C. B. MARSON.

Dr. Cecil Brittain Marson, aged 35, Professor of Physics at the Municipal Technical College, Hull, was found on Oct. 26 in a state of collapse in his laboratory at the College. Medical aid was summoned, but Dr. Marson died before he could be removed to hospital. He took up his appointment at the College about six weeks ago.

Dr. Marson had an international reputation as a fuel technologist, and his contributions to the literature of fuel, especially in regard to coke, are regarded as authoritative. He began his career in the laboratory of Captain J. A. Foster, the East Riding County Analyst, at Hull. He served for four-and-a-half years during the war, chiefly with the French Army, in which he held the rank of Quartermaster and Paymaster. Afterwards he entered the Department of Coal, Gas, and Fuel, with Metallurgy, at the University of Leeds, and had a brilliant career. He was awarded the degree of Bachelor of Science with first-class honours in fuel and metallurgy, and followed by taking the degree of Doctor of Philosophy. He was also awarded the Gas Research Fellowship of the Institution of Gas Engineers, tenable at Leeds University, and he worked on the Joint Research Committee of the Institution at the University.

From Leeds he went to Newcastle, as Chief Chemist of the Northern Coke Research Committee, and, for three years, he was engaged on research at Armstrong College, Newcastle, under Prof. H. V. A. Briscoe, who was then Director of the Coke Research Laboratory.

Dr. Marson was conspicuously successful in every post that he fulfilled, and his untimely death undoubtedly cut short a promising career. He was married and had two children.

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MR. F. E. COOPER.

Just as we go to press, we learn with regret of the death, at the age of 72, after a brief illness, of Mr. F. E. Cooper, on the night of Monday, Oct. 31 last. Mr. Cooper was well known as Secretary of the Gas Companies' Protection Association since it was founded in the year 1898. He was, in fact, responsible for sending out the original circular in July of that year, announcing the formation of the Association, with Mr. Henry Kimber, M.P., as President, addressed to all the then existing gas companies with capital of £30,000 and upwards. Mr. R. W. Edwards, Managing Director of the Mid-Southern Utility Company, and the present Chairman of the Association, will represent the Association at the interment, which takes place at the Parish Church, Old Woking, on Thursday, Nov. 3.

Mr. Edwards is sending a wreath on behalf of himself and his co-Directors of the Mid-Southern Utility Company, and another on behalf of the Committee of the Gas Companies' Protection Association.

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Some of our older readers will learn with regret of the death of Mrs. WALLER, the widow of the late Mr. George Waller, who passed away peacefully on Oct. 27 in her 96th year. She was loved and respected by all who knew her, and retained all her faculties to the end.

"Daylight Blue" Gas Lighting

CAN YOU BELIEVE YOUR EYES ?
DAYLIGHT-BLUE GAS MANTLES
PRESERVE THE EYESIGHT &
MAKE ALL THE COLOURS OF
THE RAINBOW READILY
DISTINGUISHABLE AT NIGHT

The accompanying illustration is a night photograph of a recent window display in the Greenock Gas Showrooms. The whole of the showroom lighting, inside and out, has been changed over to " Daylight Blue " lighting with good results. The interest aroused by this display was exemplified when a local minister took the caption " Can you believe your eyes ? " as the subject of his text on the Sunday before last and made reference to the showroom display. A useful slogan used in connection with the display was " Seeing is believing with ' Daylight Blue ' Lighting." Incidentally, the photograph is possibly one of the first to be taken by " daylight blue " gas light, and it is notable that each of the seven colours of the cut-out rainbow show up individually.

THE NEWS OF THE WEEK

Floodlighting at Southport.—The Southport Corporation Foreshore Committee have asked the Gas Engineer and the Electrical Engineer to prepare schemes for floodlighting in the Marine Gardens.

Price Reductions in Scotland.—The Dalry (Ayrshire) Gas Light Company, Ltd., have reduced the price of gas by 5d. per 1000 c.ft.; and at Inverbervie the local Town Council have made a reduction of 10d.

An Electricity Failure at Newton Abbot on Oct. 23 caused much inconvenience. Church services were hindered for an hour, and the lighting of the signalling apparatus in the Newton Abbot Railway area was put out of action, resulting in delay in the movement of trains.

The Directors of Meters, Ltd., have declared the following on account of the dividends for the current year: On the preference shares at the rate of 5½% per annum; on the ordinary shares at the rate of 5% per annum. The dividend warrants will be posted on Nov. 14.

The Output of Gas from Granton Works of the Edinburgh Corporation Gas Department for the past month amounted to 273 million c.ft., being 16¼ million c.ft. (nearly 6½%) in excess of the corresponding period last year, at the same time making a record output for that month.

A Modern Homes and Fashion Exhibition was held in Luton recently. At the Luton Gas Company's stand cookery demonstrations by Miss G. E. Richardson, of Radiation Ltd., and the quick sketches and drawings of Miss B. Barrett, of the British Commercial Gas Association, provided one of the best features of the Fair.

The Blackwell Parish Council have decided to prepare estimates of the cost of carrying out a scheme of street lighting by gas. Up to the present the large Derbyshire mining area of Blackwell has been in complete darkness during the winter months, and efforts to get the streets of the scattered district lit by gas lamps have proved futile.

Bristol's "Annual Week of Darkness" is now to end, and in future the gas lamps of the city will be lighted during the week the lamplighters take their holidays. Hitherto the lamps have not been lighted while the lamplighters took their week's holidays, and this has been the subject of much complaint. It is stated that the cost of lighting the streets during the week will be £550.

The Darlington Gas Department have held an exhibition of gas appliances and demonstrations of the advantages of gas for domestic purposes at the parish hall, Middleton St. George. Since the Corporation took over the supply of gas to the Middleton St. George and Middleton-One-Row district they have been occupied in enlarging and renewing mains and services. The exhibition was opened by Mrs. R. A. Grainger, and Sir Charles Starmer, Chairman of the Corporation Gas Committee, presided.

"What the Chefs Saw," the film prepared by Messrs. Radiation Ltd., was shown in Newport (Mon.) last week. On Oct. 26, just after the concluding words of the film "Thank goodness for Gas," there was a complete failure of electricity, not only in the cinema, but over the greater part of the town. This incident has its humorous side, but, incidentally, it provided a very practical illustration of the reliability of gas. The failure lasted for about three-quarters of an hour and was the second one that evening.

Birds have Caused Electricity Failures recently at Bedford. One of the causes of failure to an overhead electric line is a large bird standing on the cross-arm of a pole to clean his beak on the wire; the bird dies, but the overload protective device operates and the supply is cut off until someone can re-close the switches. This contingency however had been foreseen and the line designed to avoid it, but this year starlings have used the lines for assembling before migrating, perching wing to wing on the horizontal insulators, and have so reproduced the same effect as the large bird. A means to overcome this difficulty is being devised.

The Cowdenbeath Gas Company, Ltd., are reducing the price of gas by 3d. per 1000 c.ft., as from Nov. 1. Substantial reductions have also been made on the various street lighting contracts operated by the Company.

American Gas Association.—Mr. R. W. Gallagher, of Cleveland, the retiring President of the American Gas Association, told delegates to the fourteenth Annual Convention that the Gas Industry suffered less from the business conditions of the time than almost any other industry. Mr. Arthur Hewitt (Vice-President), General Manager of Consumers' Gas Company of Toronto, was elected President of the Association. He is the first "foreigner" ever to receive the office. Mr. N. C. McGowan, of Houston, Tex., and Mr. Howard Bruce, of Baltimore, were named Vice-Presidents, and Mr. William J. Welsh, of New York, Treasurer.

Gas-Works Liquor to Sewers.—In connection with the new sewage disposal works at Cowdenbeath, on the system of Messrs. Activated Sludge, Ltd., of London, it is interesting to note that the gas-works effluent is passed into the sewers and is accepted and dealt with in the disposal plant without any objection. All the effluent, including the ammoniacal liquor, is passed through a small coke filter to prevent tarry matter going forward, and is disposed of through the town drains at a regular flow over the twenty-four hours. It is a point in favour of the Activated Sludge process that it can in this way be dealt with without upsetting the reaction in the tanks.

A New and Up-to-Date Store has recently been opened by the Burslem Co-operative Society, in which has been embodied all the modern appliances to save labour. It is interesting to note, therefore, that central heating has been introduced for which gas has been chosen. It is pointed out that gas has been given preference because it is considered the most up-to-date method. No labour is needed to run the plant, and at night time it can so be arranged that the gas can be turned off at a predetermined time and may be brought into use again automatically. The committee are assured that by this method the store will always be kept at a temperature suitable for their customers and their staffs.

By Joint Experiment on the part of officials of the Bradford Corporation Sewage Department and the City Gas Department, it has been found that, by certain alterations to plant at the sewage works at Esholt, the vast stocks of grease accumulating there can be made to produce an oil which will serve in place of paraffin for enriching the water gas manufactured by the Gas Department. Bradford accumulates tremendous quantities of grease from the wool industry effluent. It has been put to various uses, but most of them ceased to be on a large scale at the end of the war. The experiments for oil extraction have proved so successful that the Gas Department has placed an order for 400 tons of the grease, which is being removed to the gas-works by tank wagon at the rate of about 22 tons per week, and is reducing the Department's expenditure in foreign paraffin.

How to Get the Best Light from Gas.

An interesting little booklet has recently been published by the British Commercial Gas Association with a view to providing the consumer with useful information, set out in an understandable manner, in regard to the method of obtaining the best results from gas lighting fittings.

"Are you getting full value for the money you spend on your lighting?" it is asked. "If you wish to get the best out of your gas lighting and cut down your gas bill at the same time, you should either arrange with your local gas undertaking for the proper maintenance of your installation, or clean the burners regularly yourself."

The booklet then goes on to explain in detail how every consumer can easily and efficiently maintain the lighting fittings in good working order. It is often assumed, the publication points out, that if an incandescent gas burner

THE NEWS—continued.

gives a poor light the mantle should be renewed. This is frequently wrong. Unless the mantle is broken it never loses its light-giving power. The real explanation of poor lighting is generally the accumulation of dust on the burner—on the injector, the air inlet, and the gauze. It is then shown by means of diagrams how the different parts of the burner can be dismantled, cleaned, and adjusted. Attention is also drawn to modern gas switches, and consumers are invited to try one in the room most used. It is pointed out that they are cheap and easy to install, and eliminate that incentive to leave the gas light on when going out of a room for short periods, so wasting gas.

Altogether this should prove a very useful booklet for undertakings to distribute to their consumers, and should do much to create interest and appreciation in up-to-date gas lighting.

Industrial Gas Laboratory at Cardiff.

Coal Gas as Petrol Substitute.

Important facts relating to the latest experiments carried out in Birmingham to ascertain the possibilities of gas in compressed form replacing petrol for running internal combustion engines were revealed by Dr. C. M. Walter, Engineer-in-Charge of the Industrial Research Laboratory of the Birmingham Gas Department, speaking at a luncheon given at the Park Hotel, Cardiff, on Oct. 27. The occasion was in connection with an inspection of the Industrial Gas Laboratory and Showrooms set up at the Bute Terrace Works of the Cardiff Gas Light and Coke Company by gas undertakings in Wales and Monmouthshire.

Mr. L. G. WILLIAMS, Chairman of the Cardiff Gas Light and Coke Company, presided.

Mr. H. D. MADDEN (Engineer and Manager to the Cardiff Gas Light and Coke Company) said the new laboratory formed part of the National Gas Council's scheme to link up the trade and industrial gas laboratories throughout Great Britain. There were laboratories in London and Newcastle, but the greatest of all was in Birmingham. After referring to the work done in Cardiff, Mr. Madden said he was pleased to think that Dr. Sinnatt, Director of Fuel Research at Greenwich, had come to see what they were doing. With regard to Dr. Walter, they knew the valuable work he had done in the Industrial Research Laboratory of the Birmingham Corporation Gas Department, and he might be able to tell them something about the use of compressed gas for the propulsion of motor vehicles. They also welcomed Mr. Fottrell, Joint Manager of the National Gas Council.

Dr. F. S. SINNATT, responding to the principal toast, said that it was obvious from the wealth of detail in the exhibit, and the amount of information that consumers could obtain, that the laboratory at Cardiff would serve an immensely important purpose. Gas consumers as a body were satisfied with the appliances they had, but it was clear from the Cardiff exhibit that the Gas Industry was making improvements which were of importance to the consumers. It was now possible for the appliances to be examined in detail in the laboratory, and under working conditions in the showrooms, and to hear of the benefits that would accrue from their use. It was sometimes forgotten by those who were discussing the coal industry that an increase in the use of gas meant either an increase in the coal required, or an increase in efficiency, and the coal industry as a whole should welcome the laboratory, which was, in fact, an exhibit of the use of coal. It was a shining example of the "Back-to-Coal" idea. Everyone was aware that in certain areas oil was encroaching on the markets generally supplied by coal and coke, and one of the best means by which it could be combated was by the wider use of gas. He was sure that Cardiff was to be congratulated upon this effort. All were aware of the excellent work Mr. Madden had done as a member of the Fuel Research Board; all who knew his capacity and energy would not be surprised to learn that this was among the first laboratories of its kind in the country.

GAS COMPARED WITH PETROL.

Dr. WALTER, after referring in congratulatory terms to the work being done in Cardiff, said that in these days gas producers had to show to the world what gas really could do. Since December a large number of experiments had been carried out in Birmingham to ascertain the possibilities of gas in compressed form replacing petrol for running internal combustion engines. They had carried out a large number of bench tests on engines from 7 to 70 H.P., starting off with satisfactory results and finishing during the last week with results which were more than eminently satisfactory. They had been able to get better power with gas in an engine than they were able to get with petrol. "At the present time," he said, "I have an engine on the road running a van, and it is developing 10% more power than with petrol. Yesterday I went out with a ton load in this van which on petrol has a maximum speed of 42 miles per hour. For a considerable distance we had the van running at 50 miles per hour with wonderful acceleration. The gas consumption amounted to 21·6 c.ft. per mile, which is equivalent to a performance corresponding with about 250 c.ft. of gas to the gallon of petrol. If we take gas at 2s. 6d. per 1000 c.ft., this is equal to petrol at 7½d. a gallon. We find no trouble at all with engines running in this way, and they are less troublesome." The gas had to be dehydrated in the process of compression, and one of the condensates was a mixture of water, lubricating oil, and benzole compounds. From this they were producing a wonderful motor spirit. [Laughter.] In quality it was better than No. 1 petrol, and almost as good as aviation spirit. They were producing about 90 gallons per million c.ft. If half the petrol used for goods and passenger carrying vehicles were replaced by compressed gas, it would mean that 22,000 more miners would find work, and a very large number of people would be absorbed in the process of manufacture.

Mr. E. J. FOTTRELL said they were celebrating the fruition of a plan which Mr. Madden had had so much at heart, and he wished to join the other speakers in congratulating him on its outcome. After referring to the developments in the use of gas, Mr. Fottrell said the Government were now beginning to realize that the Gas Industry's sphere of usefulness had been restricted by senseless restrictions imposed upon them in years gone by. At long last a Committee was about to make a report, and they could reasonably hope that in the near future the great majority of the restrictions under which they had suffered would be removed. If so, they would be able to take the fullest advantage of the research work that was being carried on in that and other centres.

Mr. J. H. CANNING (Engineer and Manager to the Newport (Mon.) Gas Company), on behalf of the contributing agencies, expressed their appreciation of all that is being done at the Bute Terrace Works of the Cardiff Gas Light and Coke Company for developing the use of coal for industrial purposes; and his remarks were suitably acknowledged by the CHAIRMAN.

Fifth List of Bookings for Film "Tar."

The following provisional bookings of the film "Tar," subject to local variations and contingencies, have been made for three days' showing at each theatre:

Nov. 17.—Palace, Freshwater.
,, 24.—Cinema, Radcliffe-on-Trent.
,, 28.—Capitol, St. Austell.
Dec. 5.—Electric, Wokingham.
,, 8.—Pooles, Ipswich.
,, 8.—Tudor, Crookham, Hants.
,, 12.—Victoria, Newmarket.

Gas Exhibition at Penrith.

Mr. Fred Stephenson, J.P., Chairman of the Penrith Urban Council, in opening the town's annual gas exhibition, which runs for a week, said he was probably the largest consumer of gas in Penrith. He complimented the Engineer and Manager (Mr. John Corrigan) on the excellent way he had arranged the exhibition, and had also introduced a new feature, in the floodlighting by gas of their beautiful Town Hall. During the past seven years the gasworks had been almost completely re-modelled, and were a credit to the town; a new gasholder was nearing completion. It was, he said, very desirable that exhibitions of that kind should be held, and he trusted the townspeople would appreciate its usefulness.

Mr. J. E. Newton, Chairman of the Gas Committee, spoke of the great progress which had been made in the town by the use of gas. An exhibition now and again was an excellent way of calling public attention to the wonderful appliances they had to offer. The Committee, he added, had every confidence in their Manager.

The cookery demonstrations were given by Mr. E. Sanderson, of Messrs. John Wright & Co., Ltd., Birmingham; and Miss E. Barnes, of Messrs. W. H. Dean & Sons, Ltd., Burnley, was in charge of the washing demonstration.

Coal and Its Uses.

"Coal and Its Uses" formed the groundwork of an address by Mr. G. L. Jennings, of the British Commercial Gas Association, to the Exeter Rotary Club, on Oct. 24.

Mr. Jennings said coal could be used in two ways. It could be burned in its natural state, or it could be "cooked" scientifically. When a coal fire was lighted a large amount of smoke was given off, in which was sulphur dioxide. This mixed with the moisture in the air and formed sulphurous acid. Of the forty million tons of coal annually consumed for domestic purposes it was estimated that two-and-a-half million tons were wasted in the form of smoke. When the amount of smoke which went into the atmosphere from coal fires was increased to any marked extent there was a corresponding rise in the death rate from diseases of the chest.

Another detrimental result of this use of coal was that in many towns 20 to 25% of the sunshine was lost as com-

pared with the amount enjoyed in the country. The vapours and gases given off by this burning of coal caused rapid and enormous deterioration to the stonework of buildings, and a Committee appointed by the Ministry of Health had stated: "We are satisfied that domestic smoke causes a serious danger to health and property." In London many of the older buildings, St. Paul's, the Tower, the Houses of Parliament, Somerset House, and many others, were going into decay, which in London was difficult to check, but the Taj Mahal in India, which was built about the same time as St. Paul's Cathedral, was much the same to-day as when it was erected. Its stonework was almost undamaged, whereas the stonework of St. Paul's was in many places worn away so much as to be dangerous. This wearing away was caused largely by smoke. Coal, however, could be put to other and more beneficial uses. By scientific treatment over a hundred bye-products could be obtained which could be put to a surprising diversity of uses.

North of Scotland Industry Exhibition.

This Exhibition was organized in the Olympia Halls, Aberdeen, from Sept. 5 to 24 by the "Aberdeen Press and Journal" for the purpose of giving a fillip to trade in the North of Scotland, and to bring the producer and consumer into closer and profitable contact; also to demonstrate that in the North of Scotland is housed a wide variety of industries which are as enterprising as any, and which cannot be surpassed in efficiency and in excellence of workmanship.

The Aberdeen Corporation Gas Department, in co-operation with Radiation Ltd., acquired considerable space in this Exhibiton, which they divided up into a kitchen, bathroom, and sitting room, with plenty of space for numerous gas appliances. There was displayed a large variety of modern gas cooking stoves in attractive coloured enamels, fitted with "Regulo" oven heat controllers. Radiation Ltd. also exhibited a large assortment of the latest gas fires in various designs, sizes, and colours, also radiators of different types, as well as a selection of gas wash-coppers.

An attraction in the kitchen was the tastefully built-in tiled recess which accommodated a "Beau" cooker, a "Hurro" circulator, and a gas fire. In the bathroom an "Ascot" multi-point water heater supplied hot water to bath and lavatory basins, and created much interest. Those well-known smaller types of water heaters—the "K.C.U.," "Lynton," "Newlyn," &c., were also fitted, demonstrating their extreme usefulness over sinks and wash-hand basins, &c. Cookery demonstrations of popular and tasty dishes were given twice daily in a reserved space by Miss E. D. Crossland, of Radiation Ltd., and were well attended.

An appliance which created considerable interest among architects and engineers was the "Vesta" auto-control boiler for central heating by gas, which was actually at work and connected to suitable radiators.

The whole stand was beautifully illuminated by a selection of cluster burners with bowl fittings controlled by distance switches.

A special feature of the Exhibition was a granite-built bungalow, completely furnished and standing in its own grounds, which comprised sunk rock garden complete with a miniature waterfall. The bungalow was fitted with gas cooker, gas fires and wash-boiler, and at night both the bungalow and the gardens were brilliantly illuminated by gas floodlighting, which comprised four lamps each with eight 2-light cluster burners (16 burners per lamp) with a suitable large conical reflector to each lamp.

The Exhibition had a continuous run for three weeks, and over 170,000 passed the turnstiles. The Gas Department did good business, not only at the Exhibition but since, and feel that excellent publicity has been achieved.

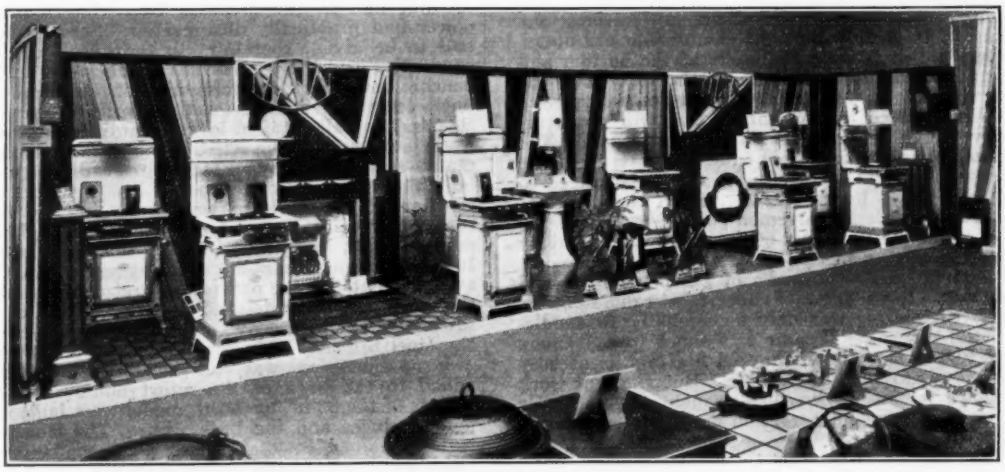
The "Back to Coal" Movement.

Opening a Gas Exhibition on Oct. 28 at Hinckley, organized by the District Council, Sir FRANCIS GOODENOUGH, Chairman of the British Commercial Gas Association, said that the progress of the Gas Industry in recent years had caused much surprise to those who thought that, with the advent of electricity, the Gas Industry was doomed to—perhaps a lingering but, at least, a certain—death. The reason for that progress was that gas found a place, and a growing place, in every sphere of work, public and private, where heat was required.

As a national industry, the Gas Industry was deeply concerned that the nation's greatest material natural asset—coal—should be used in the fullest and most profitable way to the nation at large. It must never be forgotten that *even where gas displaced coal, the collier kept his job.* The best way "back to coal"—that was, back from imported oil to home produced fuel—was through the gas-works and the electricity generating station, which, between them, enabled industry to obtain heat and power from coal with an increase in efficiency of production, a marked improvement in conditions of labour, and without fouling the atmosphere of our towns and cities.

There was, indeed, an enormous field for the further use of gas throughout the industries of the country, as well as in the homes of the people, rich and poor alike.

Gas Exhibition at Dunfermline



A successful Gas Exhibition was held recently in Dunfermline under the auspices of the Corporation Gas Department. The illustration above shows the stand of Messrs. R. & A. Main, of London and Falkirk. A prominent feature of the display was the new "Gloria" fire, complete with surround, hearth, and mantel, which attracted much favourable comment. The latest types of gas cookers in green and cream "Mainamel" finish emphasized the high standard of elegance to which the modern gas cooker has been brought.

A PIONEER SCOTTISH GAS : : UNDERTAKING* : :

Helensburgh's Installation of Continuous Vertical Retorts

Twenty-one years ago the Helensburgh Corporation Gas Undertaking was the subject of critical interest on the part of the Gas Industry, for the then Manager had taken the bold step of installing Glover-West vertical retorts for the production of the whole of the gas required in the supply area. Many thought him daring to the point of foolhardiness, but time has proved him as foreseeing as courageous, and what was then an adventure is now merely commonplace. The Helensburgh plant was the first installation of continuous vertical retorts to be erected in Scotland definitely for the production of town gas, and either the third or fourth in the United Kingdom—coal being first carbonized on July 11, 1911. The strong faith reposed in the new plant is illustrated by the fact that immediately it was put into operation the horizontals were shut down and were never again worked. The 21 years which have passed are writ large in the history of the development of the undertaking, and the great success achieved since the conclusion of the war is in large measure complementary to the success of the continuous vertical retort.

"A Bedroom of Glasgow."

But before going further it seems desirable to say a few words about the Burgh itself. Little more than a century old, it is pleasantly situated on the hill lands above the Firth of Clyde, at the mouth of the Gareloch, in the western part of the county of Dumbarton. There is no industry, the town being purely residential in character. Indeed, it was facetiously described by a speaker at a recent Institution of Gas Engineers' meeting as "a bedroom of Glasgow"—that great industrial city, distant 22½ miles to the east. Helensburgh is a model of town planning, being built in squares with wide streets having tree-planted grass verges. Plant life flourishes and the gardens show a wonderful profusion of bloom almost all the year round. The population numbers about 10,000. Besides supplying the Burgh, the Gas Undertaking supplies gas to the outlying villages of Rhu and Shandon on Garelochside, and to Craigendoran on the east side. Purchased by the Corporation in 1899 from the Company which had operated the works from 1844, large reconstructions were effected between 1899 and 1910, when the need for new carbonizing plant became imperative.

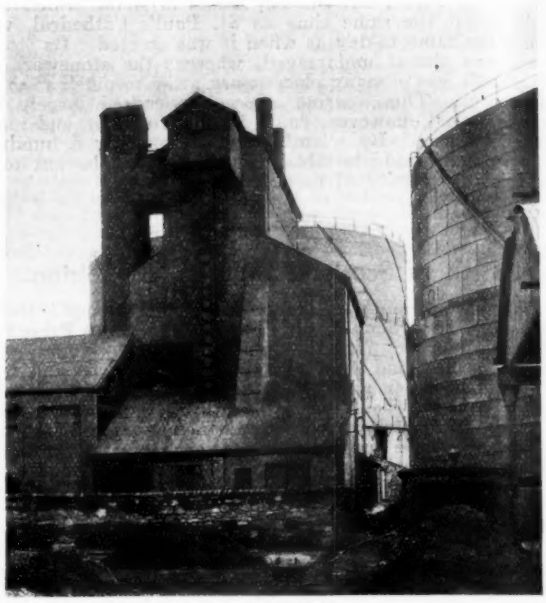
The Glover-West vertical retort plant erected in 1910-11 consisted of 16 retorts capable of producing daily half-a-million c.ft. of gas of 16 candle-power. In 1911 the output of gas for the year was 60 million c.ft. For the past financial year the output was 180 million c.ft. The record output for 24 hours is 840,000 c.ft. There are still only 16 retorts. The productive capacity of the plant has been increased by steaming and by reconstruction, and when the present reconstruction of the installation is completed shortly the plant will be capable of producing about one million c.ft. of gas per day.

The original retorts were built of fireclay sections, the retorts being 23 ft. long with eight combustion chambers, two secondary air circulating chambers at the bottom and two waste-gas circulating chambers at the top. The top dimensions were 27 in. by 12 in. Two retorts formed a unit, four being heated by one half of the twin producer. Pioneers pave the way for less adventurous people. The producers had square-section firebars, almost flat; the grate area had no margin, and the producers were guaranteed to clinker up solid in 48 hours—that is, when they did not clinker up in 24 hours. Improvement was effected later by reducing by 4½ in. the thickness of the outer walls, and by the introduction of step-grates.

For the first full year the make of gas per ton of coal carbonized was 11,683 c.ft., of uncertain candle-power. One thing is certain—it was only occasionally 16 candle-power, and the "new gas" came as a shock to consumers accustomed to gas from hand-charged horizontals at 9000 c.ft. per ton, and *enriched by benzole*. But vigorous work in the district achieved the displacement of flat-flame burners by incandescent burners, and gradually complaints subsided and died.

The gas was carried away from the retorts through pipes slightly inclined to a collecting main—called the "piano main" because of its shape—from which glutinous tar regularly had to be fished.

* From "West's Gas."



[*Photo. by J. E. Polmont.*

Glover-West Retort House at Helensburgh.

Steaming Process Commenced.

At round about the above figure the make per ton remained until the year 1917, when the steaming process was commenced, and the make steadily increased until it reached 17,517 c.ft. in 1927, when the No. 1 section of eight retorts was reconstructed.

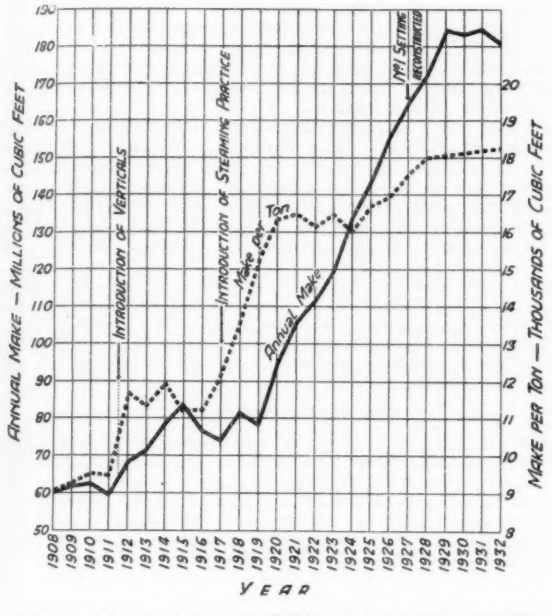
Apart from patching and odd repairs of a minor nature the original installation remained unchanged until the year 1920, when it was found desirable to rebuild six of the eight retorts in No. 2 section. These retorts had been at work and under heat for approximately 1800 days. The new retorts were built up of silica sectional blocks, with fireclay blocks at the top and bottom. The two retorts left standing in this setting were not dismantled until the present year, when the whole setting was rebuilt.

From then until 1925-1926 repairs and renewals of retorts hardly figured in the scheme of things. By that year the output of gas had increased to about 160 million c.ft. per annum, and in the previous two winters reserve retort power had practically disappeared. Serious consideration had to be given, therefore, to the question of increasing productive capacity. Various schemes for extending the benches and adding to the number of retorts were reviewed, but were rejected as not satisfactorily meeting the situation, as they all entailed large capital expenditure, did not fit in neatly with the existing benches and coal-handling plant, and contributed nothing towards the need for rebuilding the existing retorts. An entirely satisfactory solution of the problem was arrived at by the decision completely to reconstruct one section of eight retorts on modern lines, and a contract for this work was placed in 1926. The long-drawn-out coal stoppage of that year upset arrangements for the provision of refractory materials, and the work had to be delayed until the spring of 1927. The setting was then entirely demolished between the end walls, the steel bracings only remaining. A new twin producer of large dimensions was built, necessitating a lean-to being added to the back of the retort house, and eight silica retorts of the 33 in. by 10 in. model were built between the new producer and the back walls. The length of the retorts remained at 23 ft., but the secondary air heating chambers became combustion chambers.

The retorts then demolished had been in service for almost 16 years without repairs of other than a minor nature—a wonderful testimonial to the quality of the material and the strength of the construction. Watching them being broken up caused a distinct wrench—they had

been such staunch friends. The minimum number of days that any of these retorts had been under fire was about 3500, and the setting had carbonized approximately 70,000 tons of coal. From July 11, 1911, to May 15, 1927, the quantity of coal carbonized had been 116,918 tons, and the quantity of gas produced 1,696,792,000 c.ft.

The old coal boxes and valves were re-fitted, but this proved to be false economy, as owing to the reduction in the width of the retorts at the top, trouble was experienced with choking in the necks of the boxes whenever coking coal was carbonized.



The Annual Gas Production and "Make per Ton" at Helensburgh Corporation Gas-Works during the last 25 years.

The new retorts of silica have been able to put through from 65 to 72 cwt. of coal per day, the output of gas varying according to the class of coal used from 55,000 to 65,000 c.ft. of gas of 440 B.Th.U. calorific value. The productive capacity in the same space has been increased therefore by approximately 50% as compared with the original setting.

At the same time an electric lift was installed for hoisting coal in the event of elevator breakdown. For 16 years there had been no alternative means of raising coal to the overhead bunkers, yet although there had been odd stoppages of the coal elevator and coal-conveying plant, on no occasion had it been impossible to effect the necessary repairs before the bunkers ran short of coal. The same elevator has always been used for raising coke to the coke bunker supplying the gas producers. During 1926 the links, trunnions, and axles were all renewed.

With the provision of the hoist it became possible to consider a long-dreamt-of improvement of the coal-handling facilities. In the original installation the coal breaker was fixed just below ground level, and the coals were tipped on to the ground in front, necessitating shovelling into the breaker, through which all fuel, whether nuts or coal, had to pass. The overhead bunkers were originally of 24 hours capacity, but this capacity was reduced to about 16 hours by the increased throughput of the new retorts. Accordingly, in the summer of 1931 the coal breaker pit was deepened by 6 ft. and enlarged to permit of fixing a 10-ton underground coal-receiving hopper, the breaker and other machinery being re-fitted to suit, with a breaker by-pass for nuts. The conveyor buckets were converted to the lip type by riveting lips to the old gravity buckets. The roof of the house and the conveyor track were lifted 7 ft., and the bunker sides raised a similar height, thus increasing the storage capacity to a comfortable 48 hours' supply. This alteration has proved of great advantage, reducing labour costs and the time required for coal elevation, besides eliminating Sunday labour on coal-handling. This plant appears good for many years' further service.

This summer the second setting has been reconstructed on lines similar to the first reconstruction, with the addition of complete new top-of-stack fittings, coal boxes, plug-type valves, collecting mains, and a new foul main. So there disappears the "piano" collecting main—but there are no mourners. Six of the retorts in this setting, as already stated, had been rebuilt in 1920; the other two were the last of the original retorts—somewhat broken, somewhat scarred—yet in the winter of 1931-32 were still heating quite well and carbonizing coal faithfully. In the early summer of next year the top fittings of the other setting will be replaced, and the scheme of reconstruction completed.

The installation will then have been completely remodelled on up-to-date lines and free of all debt charges—the original loan capital having been repaid, and all the costs of reconstruction met from revenue account.

When the verticals were erected, the price of gas was 3s. 4d. per 1000 c.ft.; by 1914 it had been reduced to 2s. 6d., and for the past eight years it has been steady at 2s. 1d. (5·68d. per therm) excepting for a period of six months during the 1926 coal stoppage. Since the introduction of the steaming process, the thermal yield per ton of coal has steadily increased, and there was a decided advance on previous figures when the first reconstructed setting was put to work. This setting has been continually at work since September, 1927, and the condition of the retorts and brickwork is excellent.

The accompanying chart shows the development of the output of gas and the quantity made per ton of coal since the vertical retorts were introduced.

Since the conclusion of the war other parts of the plant have had attention, and there have been erected an additional gasholder of 500,000 c.ft. capacity, making a total storage of 900,000 c.ft.; a new Lancashire boiler; water-tube condensers; exhauster—and new overhead purifiers are in course of construction. On the district, mains have been enlarged and extended to ensure efficient service at all points. Appreciation of the value of gas service for all domestic purposes is demonstrated by the fact that the average annual consumption per consumer is almost 54,000 c.ft., despite the keen competition of the Clyde Valley Electric Power Company.

The Helensburgh Gas Undertaking and the gas consumers are entitled to congratulate themselves that (to quote a sceptic of 21 years ago) fools rushed in where angels feared to tread. They were not fools—only wise beyond their time.

DAVID FULTON.

PARLIAMENTARY INTELLIGENCE

[From Our Special Correspondents.]

House of Lords.

Special Orders.

Special Orders proposed to be made on the application of the County Borough of Rotherham and the Wisbech Lighting Company have been laid before the House and referred to the Special Orders Committee.

Gas Undertakings (Basic Prices).

A proposal to set up a new Committee on the question of basic prices, arising out of the Bath Gas Order, is now before the House of Lords. A motion in the following terms has been put down by the Lord Chairman of Committees, but no date has been fixed for its discussion:

> The Chairman of Committees to move to resolve, That it is expedient that a Joint Committee of both Houses of Parliament be appointed to consider and report whether, as one of the methods of giving effect to the basic price system of charge by gas undertakers in those cases in which a power to make a differential charge in respect of any part of the existing or intended limits of supply is proposed to be continued or granted, it is expedient to authorize a separate basic price in respect of each such part, arrived at by adding to the basic price fixed in respect of the area for which no differential charge is proposed a sum representing the differential charge as proposed to be authorized or continued, or as actually made.

House of Commons.

Special Orders.

A Special Order on the application of the Wisbech Lighting Company has been presented and ordered to lie upon the Table of the House.

NEW CARBONIZING PLANT AT GRIMSBY

Inauguration of W.D. Continuous Verticals

An important development of the Grimsby Gas Undertaking was completed on Oct. 25, when the Mayor of Grimsby (Mr. C. W. Dixon) set in motion a new carbonizing plant at the Catherine Street Works of the Great Grimsby Gas Company.

Later, at tea, the Chairman of the Gas Company (Mr. William Bennett, J.P.) proposed a vote of thanks to the Mayor.

Mr. BENNETT said that the works of the Company were modern. The Company was controlled by a Board of Directors on which there were some of the leading business men in the town and in Col. John Kennington, the Engineer and Manager, they had a man who was thoroughly efficient, and with whom it was a pleasure to work.

Seconding the vote of thanks, Mr. W. H. WINTRINGHAM, J.P., the Vice-Chairman of the Company, gave an interesting survey of the progress of the Undertaking from its inception in 1836. Mayors of Grimsby in the past had been closely associated with the Gas Undertaking, so that the present Mayor was creating no precedent in helping in the kindly way he had done that day.

The CHAIRMAN handed to the Mayor a gold pencil as a memento of the occasion; and in returning thanks for the gift and the vote of thanks, the MAYOR said the Gas Company had a wonderful history.

Mr. F. B. RICHARDS, Chairman of the Woodall-Duckham Companies, handed to the Chairman of the Gas Company a silver salver as a souvenir of the occasion, and expressed his appreciation of the kind things that had been said about his Company. He also thanked Col. Kennington for the co-operation and help he had given to the contractors. The fact that the Gas Company had expended a considerable sum of money in new plant showed that they had confidence in the future.

The Ancient Borough of Grimsby was first given a supply of coal gas from private gas-works erected in 1836 by Mr. Richard Holme, Civil Engineer, Kingston-on-Hull. The streets of the town were first lighted by gas in 1838. The necessary Parliamentary powers were obtained, and the first ordinary meeting of the shareholders of the Great Grimsby Gas Company was held in August, 1846. Mr. Horatio Brothers was appointed Manager of the Company, and the first gas-works cost £850.

In 1868 six acres of land off Sheepfold Street were compulsorily bought from the Grimsby Corporation for the erection of new works.

The present Manager, Col. John Kennington, was appointed in March, 1929. During the winter 1929-30, it became evident that new gas-making plant would have to be installed to meet the increasing demands. After careful consideration, it was decided to erect an installation of six Woodall-Duckham upwardly-heated continuous vertical retorts, capable of producing daily 750,000 c.ft. of gas of 500 B.Th.U. per c.ft.

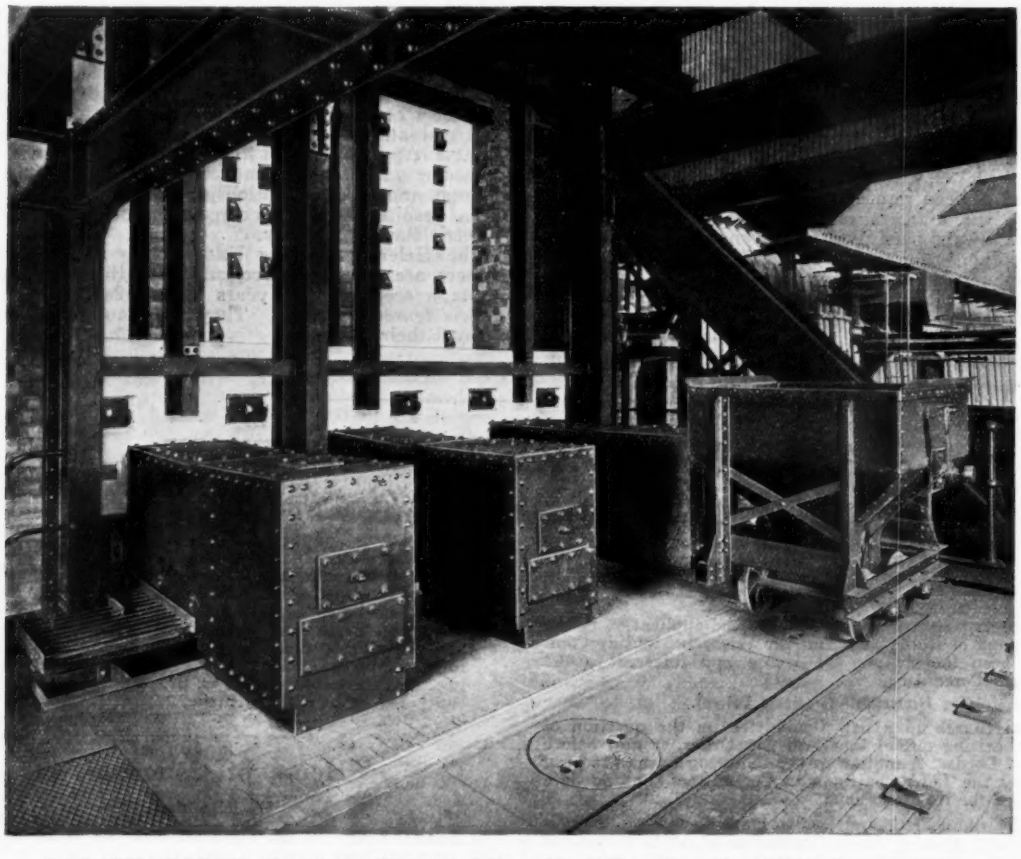
The policy of the Company has always been a progressive one. New showrooms were opened in Osborne Street in 1929. A supply of gas was given to Keelby in 1931.

There are 17,950 consumers, and during the last 25 years the gas sold has increased from 288 million c.ft. to 410 millions per annum.

THE NEW INSTALLATION.

The installation consists of one bench of six latest type upwardly-heated Woodall-Duckham continuous vertical retorts, capable of carbonizing 48 tons of coal a day. The retort bench is heated by a battery of two step-grate producers situated at the retort house floor level at one side of the bench. The installation is erected in a new steel-framed, brick-panelled retort house, built at the end of the old retort house. The nature of the ground at the site made it necessary that the foundations of the installation should consist of a raft supported on piles.

The six retorts are arranged so that any one retort can be heated up, cooled down, or scurfed without affecting the others, and, in addition, a transverse division wall is built between one pair of retorts, and the remaining four



PRODUCER CHARGING PLATFORM SHOWING PRODUCER COKE SKIP AND PRODUCER GAS NECKS.

so that a complete re-setting of either group can take place without interfering in any way with the working of the other group. Each retort is about 25 ft. high and of rectangular tapered shape, having a major axis of 82 in. and at the top a minor axis of 10 in.

The retort design is in accordance with the latest Woodall-Duckham practice, in which, while retaining the well-known vertical flue construction which lends rigidity to the retort structure and facilitates inspection from one level, the combustion of the heating gases takes place in an upward instead of in a downward direction. This allows a zoning of heats to be obtained which has been found to give the advantages of perfectly regular travel of the coal, less scurf formation and less loss of time at scurfing periods, and better steaming conditions.

This system of upward heating in vertical flues, which follows the natural flow of the hot combustion gases, is particularly simple to put into operation and control. When the heats have once been regulated, only the steam pressure injecting the primary air to the producers and the waste gas dampers need adjustment.

By the introduction of the upward heating principle the temperature in the vertical combustion flues is sufficiently reduced at the point where erosion of the silica material normally takes place to allow the retorts at this level to be constructed with perfect safety in firebrick. By the time the coal has passed this belt of firebrick and enters the silica portion of the retorts, it has acquired sufficient heat to avoid the extreme differences in temperature on either side of the retort wall, which form the main cause of erosion of silica material at this point. In this way the full advantage of silica construction as regards high throughput of coal is obtained, with a reduction in maintenance costs.

Producers.

Two step-grate producers are provided for supplying the gas for heating the retorts. They are situated at the retort house floor level at one side of the bench and arranged so as to be entirely independent of each other. The gas from either producer may be taken to the heating flues of any retort.

The producers are constructed with ample grate area for efficiently heating the retorts when burning a mixture of coke with a proportion of breeze. The step-grate eliminates the need for clinkering. The only attention required to keep the fires in proper condition is a periodical pricking-up at intervals of four hours or longer dependent on the class of fuel used. In order to give the producers maximum flexibility both as regards gas output and as regards the class of fuel used, doors are provided on their fronts and arrangements made for the injection of primary air by steam to overcome the resistance of the fuel bed.

Waste-Heat Boiler.

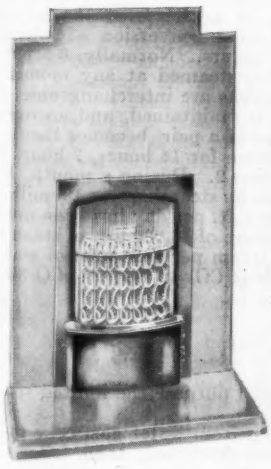
For utilizing the major portion of the heat contained in the waste gases, after they leave the retort bench and before they are discharged to atmosphere, a waste-heat boiler is provided. The boiler, which is of the horizontal natural-draught fire-tube type, designed for a working pressure of 100 lbs. per sq. in., is large enough to deal with the waste gases from 8 retorts when the installation is extended. The boiler is fitted with all the necessary steam and water mountings and fittings, including a high and low water alarm.

NOTES ON PLANT AND PROCESSES

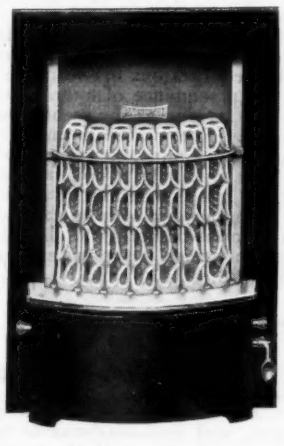
The "Flatholme" Register and Fire.

The enterprise and energy of the Parkinson Stove Company is again evidenced by a pleasing new built-in gas fire—the qualities of which are summed up in the name "Flatholme" series.

The "Flatholme" has been designed especially to meet the demand for an elegant and efficient register and fire of moderate cost, which can be artistically finished and will harmonize with the present-day interiors of small houses and flats. The design secures a comparatively flush setting, and the parts, being interchangeable, are easily replaceable.



The "Flatholme" Built-in Fire with step top Register and Base.



The "Flatholme" Built-in Fire without Register.

The fire is built on modern lines, with curved front giving a wide distribution of heat from side to side, while radiants are positioned to secure a more effective vertical distribution of the heat also. The registers are supplied with a step-top, or square top with or without shelf, and a suitable base is also provided. Artistic finishes include several charming colours, or the fire and base can be supplied in art black, with surround in priming coat.

To-day it is frequently necessary that a gas fire and register shall be coloured exactly to match or harmonize with the surrounding decorative scheme of a room, and the "Flatholme" can be supplied with priming coat only, so that individual tastes and needs can be satisfied by the local decorator.

These registers and fires are peculiarly suitable for housing estates and smaller rooms and should especially appeal to the contractor. The "Flatholme" fire can also be used with an existing suitable fire grate by fixing it in front of a metal or asbestos cement surround finished to harmonize with the existing mantel.

The "Thorncliffe-Baldurie" Concentrating Plant.

An illustrated leaflet has been published by Messrs. Newton, Chambers, & Co., Ltd., of Thorncliffe, near Sheffield, dealing with their "Thorncliffe-Baldurie" gas liquor concentrating plant, which has been specially designed to meet the requirements of the Gas Industry.

It is essentially a steam distillation process carried out in a properly designed and controlled still, in conjunction with a preheater which utilizes the waste heat from the still head to preheat the incoming weak liquor, resulting in minimum steam consumption. The weak liquor is concentrated from about 2% to 15%, the volume is reduced ten times, and the concentrated liquor is no more volatile than crude liquor. The effluent from the plant is less in volume and less toxic than that from a sulphate plant or of crude liquor itself. The process is entirely non-liming.

The whole process is controlled by the firm's patented system of automatic control, which ensures constant conditions without manual attention, gives safety in operation, and prevents unnecessary or prolonged stoppages. The complete unit is neat in design, requires little ground space, is low in first cost, economic in steam requirements, requires practically no attention, and produces a product of uniform quality which can be easily and cheaply transported to a central chemical works.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany.

CATALYTIC DECOMPOSITION OF CARBON DISULPHIDE WITH STEAM AND WITH HYDROGEN.

K. Bunte and F. Lorenz, in " Das Gas- und Wasserfach," 1932, 75, 765-770 (Sept. 24) and 787-791 (Oct. 1), present a thesis dealing with the factors concerned in eliminating carbon disulphide, the chief organic sulphur constituent, from gas.

The reactions studied were as follows:

With steam . . . . . $CS_2 + 2H_2O \rightleftharpoons CO_2 + 2H_2S$

With hydrogen . . . . . $CS_2 + 4H_2 \rightleftharpoons CH_4 + 2H_2S$

A successful catalytic process should be such that the catalyst functions uninterruptedly in continuous operation without becoming poisoned and without promoting formation of carbon from the higher hydrocarbons or alteration in the other constituents of the gas. The sulphides of the sixth group of the periodic system and especially those of molybdenum and uranium were found to be the most effective catalysts. Investigations were carried out with pure carbon disulphide vapour with steam and/or hydrogen as well as with coal gas containing carbon disulphide. The effect of the presence of carbon monoxide was also investigated and experiments were carried out with thiophene, ammonia, and other compounds.

The efficiency of the uranium catalyst is much greater than that of the molybdenum catalyst and that, too, at a lower temperature, hence dissociation of the sulphuretted hydrogen into sulphur and hydrogen does not take place appreciably.

It was found that the presence of carbon monoxide is not only not harmful but is actually beneficial, and that no complications arise due to the presence of the other normal constituents of coal gas. A suitable working temperature is 420° C. and decomposition of the carbon disulphide in presence of steam attains 100 per cent. in the case of the uranium catalyst. Experiments with a gas derived from a Hungarian coal and containing 32-40 grains of organic sulphur/100 c.ft. gave a purified gas containing 4 grains of organic sulphur/100 c.ft. when the gas was led over 10 grammes of the catalyst at the rate of about 2 c.ft./hour. This particular gas contained much thiophene and other cyclic sulphur compounds which normally constitute but 3 per cent. of the organic sulphur; hence, normally, a 97 per cent. reduction of the organic sulphur content should be possible.

Reference is made by the authors to recent work on the same subject by Neumann (" Electrochemie," 1931, Parts 4 and 10), who advocates a catalyst consisting of magnesia with 10 per cent. of thoria.

ADJUSTMENT OF THE COKE AND GAS MAKE TO FLUCTUATING DEMANDS AND MARKET CONDITIONS.

W. Litterscheidt in " Glückauf," 1932, 68, 838-847 (Sept. 17), discusses flexibility in carbonizing plant with special reference to coke ovens. It is possible, in the case of compound ovens, to vary both the actual and relative amounts of coke and gas for sale by altering the throughput of the battery and by using either coal gas, producer gas, or both, for underfiring. Operating conditions may thus be varied so that full advantage may be taken of market conditions as reflected in the quantities of gas and coke which can be disposed of. The inter-relationship of the factors concerned is shown graphically and by formulæ, and consideration is given, also, to the question of diluting the coal gas with water gas produced either by steaming or in a separate generator.

COKING HEAT AND TOTAL HEAT CONSUMPTION IN COKE OVENS.

K. Baum and W. Litterscheidt, in " Brennstoff-Chemie," 1932, 13, 386-391 (Oct. 15), point out that the methods used by Terres and his collaborators for the determination of the coking heat and heat of decomposition of coal are subject to very large experimental errors. Exception is particularly taken to the sinuous curves showing the coking heat at different carbonizing temperatures, and it is shown that, if allowance for experimental error is made, the values will lie on a smooth curve. It is also shown that large scale methods involving the determination of the underfiring requirements of an empty setting and a setting at work are also unreliable. The only satisfactory method is to construct heat balances for different coals as a result of full-scale operation, and to deduce the coking heat from the underfiring requirements under optimum conditions and the heat lost by radiation from the setting and in the waste gases.

STEAMING IN COKE OVENS.

H. Heckel, in " Brennstoff-Chemie," 1932, 13, 383-386 (Oct. 15), describes the application of the Collin system of water gas production by steaming as applied to a battery of 40 Collin coke ovens in the Ruhr district, but gives no information as to the economic aspects of the process.

The ovens can be linked up in pairs to enable superheated steam to be passed from a main alongside the battery via the top of the coke side door diagonally downwards through the charge of one oven and thence by way of a pipe at the bottom of the pusher-side door into the bottom of the adjacent oven, up which the steam also passes diagonally, finally leaving by way of the ascension pipe of the second oven. During the steaming process, which is carried on after the 23 hours' carbonizing time, the ascension pipe of the first oven is shut off. In the first oven, decomposition of the steam occurs to the extent of 60-75%, and the decomposition reaches 90% at the outlet from the second oven. In the second oven, some conversion of carbon dioxide into carbon monoxide occurs. Normally, 6-7 pairs of ovens are in course of being steamed at any moment. The connections between the ovens are interchangeable, so that a sequence of operations is maintained, and an oven, after serving as the second oven of a pair, becomes the first oven. Every oven is under steam for 14 hours, 7 hours in position 1 and 7 hours in position 2. During a month, the daily average make of water gas by steaming was 1·6 million c.ft., but as much as 1·8 million c.ft. per day has been made during a week with an expenditure of 56,000 lbs. of steam—*i.e.*, approximately 30 lbs. of steam per 1000 c.ft. of water gas of which a typical analysis is CO_2 4·1, O_2 0·4, CO 36·5, H_2 51·6, CH_4 1·8, and N_2 5·6%.

REVIEWS

THE MANUFACTURE OF HYDROGEN.*

The author deals with the technical and economic aspects of the manufacture of hydrogen; and the present work will be welcomed for two reasons—first, because there has hitherto been no up-to-date treatise on the subject; and, secondly, because hydrogen is becoming increasingly more important in view of its manifold applications for synthetic and other purposes. In spite of its slender size, the book contains a vast amount of useful information, and the author has employed to good purpose the limited space at his disposal.

The manufacture of hydrogen from water gas, coke oven gas, and hydrocarbons is first described; then follows a section dealing with the production of hydrogen from steam by the iron contact process. Chemical and electrolytic methods are next considered, and a survey of recent work on atomic hydrogen is made. This is followed by a list of the more important patents and a discussion of the financial aspects of the subject.

Among the electrolytic processes described is the comparatively recent development in which the gas is generated under high pressure. Due recognition is given to the vast potential source of hydrogen afforded by coke oven gas and to the low cost at which the gas may be produced therefrom.

* " Die Industrielle Herstellung von Wasserstoff," by H. Pincass (Dresden and Leipzig, 1933, Theodor Steinkopff. Pp. VIII. + 82. Price RM. 6·50 unbound, RM. 7·30 bound).

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

Midland Association

VERTICAL RETORT PRACTICE

The Autumn General Meeting of the Midland Association of Gas Engineers and Managers took place in the Imperial Hotel, Birmingham, last Thursday—Mr. E. B. TOMLINSON, of Birmingham, presiding.

Following upon the confirmation of the minutes,

The PRESIDENT said that the Association had had a communication from Mr. Arthur Coe, the Principal of the Halifax Gas College, proposing a scheme to provide a central laboratory, principally to assist small and medium size gas undertakings. The matter had been carefully considered by the Committee, who had suggested that it should be mentioned at this meeting. Particulars had been published, so that members could avail themselves of the scheme, if they so desired.

The next matter was the Papers Competition which was to be held in connection with the Public Works, Roads, and Transport Congress and Exhibition in London. Particulars of this competition appeared in the "GAS JOURNAL" on Aug. 24, but this was the first opportunity of mentioning it to the members of the Association since the information was published. He hoped that some of those present, or their assistants, had done something with regard to the writing of papers. These papers had to be in by the end of this year, although the Congress would not be taking place until November, 1933. Considerable prizes were attached to the competition.

Then he wished to refer to the Association of Public Lighting Engineers. Mr. Harold Davies, of Chesterfield, was the President of that Association for the current year, and being a Midlands man they ought to support him as far as possible. Looking into the question of how many members of the Midland Association were members of the Association of Public Lighting Engineers, it was found that the number was only seven. This was distinctly on the small side. The Association of Public Lighting Engineers was doing very useful work.

Almost on parallel lines they had had a notice about the Illuminating Engineering Society, a new branch of which was being formed in the Birmingham District. Mr. Marsh, of the Fittings Department, was the Secretary, and Mr. W. Y. Anderson, of the Birmingham Electric Supply Department, had been elected Chairman. If there were any in the Birmingham area who would like to join they should apply to Mr. Marsh for particulars.

A letter signed by Mr. J. C. Walker, of the British Commercial Gas Association, drew attention to a paper to be presented by Mr. A. H. Barker, Consulting Engineer, at nine different centres. It was very desirable that gas engineers should be present to take part in the discussion on these occasions. The paper would deal specially with large scale heating. The date of the Birmingham fixture was Jan. 16, when it was hoped that gas would be well represented.

The Committee, on behalf of the members, had sent Mr. H. J. Woodfine a letter of sympathy at the time when he was taken ill. He had unfortunately now had a slight set-back, but there was every reason to believe that he would be well again at a comparatively early date.

NEW MEMBERS.

The following were elected members of the Association:

A. B. Britton, Engineer and Manager, Hinckley.
E. Frost, Engineer and Manager, Narborough.
H. G. Gazeley, Manager, Bewdley.
A. T. Harris, Engineer, Manager, and Secretary, Great Wigston.
F. C. Harris, Manager, Ross-on-Wye.

PRESENTATION OF CERTIFICATES.

The PRESIDENT said it was a great pleasure to present Certificates in the Higher Grade Examinations in Gas Engineering and Gas Supply to those who had won them. The number on the present occasion was quite large, the names of the successful students being:

D. W. G. Scott, Birmingham	(Internal)	1st	Class	Gas	Engineering*
S. Brockbank, Bridgnorth	,,	1st	,,	,,	,,
C. J. F. Truslove, Birmingham	,,	1st	,,	,,	,,
Norman Bedingfield, Birmingham	,,	2nd	,,	,,	,,
J. A. Claydon, Birmingham	,,	2nd	,,	,,	,,
K. G. Eccleshare, Derby	,,	2nd	,,	,,	,,
R. A. Westwood, Birmingham	,,	2nd	,,	,,	,,
F. J. Kimble, Birmingham	,,	1st	,,	,,	Supply
J. E. Wilkes, Hereford	(External)	1st	,,	,,	Engineering
S. C. Bentley, Leicester	,,	2nd	,,	,,	,,
W. H. T. Johns, Cheltenham	,,	2nd	,,	,,	,,
F. W. R. Santler, Malvern	,,	2nd	,,	,,	,,
C. C. Wood, Wellingborough	,,	2nd	,,	,,	,,
R. Beech, Stoke-on-Trent	,,	1st	,,	,,	Supply

* With distinction.

OFFICERS FOR THE ENSUING YEAR.

Office-bearers for the ensuing year were elected as follows:

President.—Mr. T. H. Poulson, Stafford.
Vice-President.—Mr. R. S. Ramsden, Leamington.
Committee.—Messrs. G. R. Macfarlane, Tipton; J. H. Paterson, Ludlow; and C. F. W. Rendle, Redditch.
Auditors.—Messrs. A. H. Cranmer, Wolverhampton, and G. C. Pearson, Birmingham.
Hon. Secretary and Treasurer.—Mr. S. J. Sadler, Solihull.

THREE YEARS OF VERTICAL RETORT PRACTICE AT HEREFORD.

By ARTHUR ROBERTS, Engineer and General Manager of the Hereford Corporation Gas Department.

The inauguration of the installation of Woodall-Duckham continuously working vertical retorts complete with waste-heat boiler took place on June 27, 1929. The plant (see fig. 1) consists of twelve 62-in. retorts, each 25 ft. long and heated by two producers. The retorts are of silica, heated downwards, and each retort is a separate unit. (The general layout of the plant is shown in figs. 2 and 3.)

A 25-tons-per-hour gravity-bucket conveyor encircles the house and is used for the handling of both coal and coke, the former being received by siding, the wagons passing through a rotary tippler which surmounts a 12-ton receiving hopper and breaker. The main coal storage hoppers are of forty-eight hours' maximum load capacity, or approximately 150 tons, an interesting feature being the form of shoot from these hoppers, which is clearly shown in fig. 2, and which can, when desired, deliver coal on to an electrically-driven band conveyor running the full length of the coal store. (This store was originally the horizontal retort house.) The coal is ploughed off the belt at any point; this enables the storing of 2000 tons of coal without trimming, or 3000 tons when trimmed. A similar conveyor is housed in a tunnel under the centre of the store which permits of stock coal being re-claimed through a series of sliding doors. This conveyor delivers direct into the buckets of the gravity-bucket conveyor. The store has been filled, and on several occasions coal has been re-claimed at very small cost.

The coke is discharged from the bottom hoppers of the retorts at regular two-hourly intervals and is delivered into the gravity-bucket conveyor by means of a shoot traversing a wide gauge track in the retort house floor;

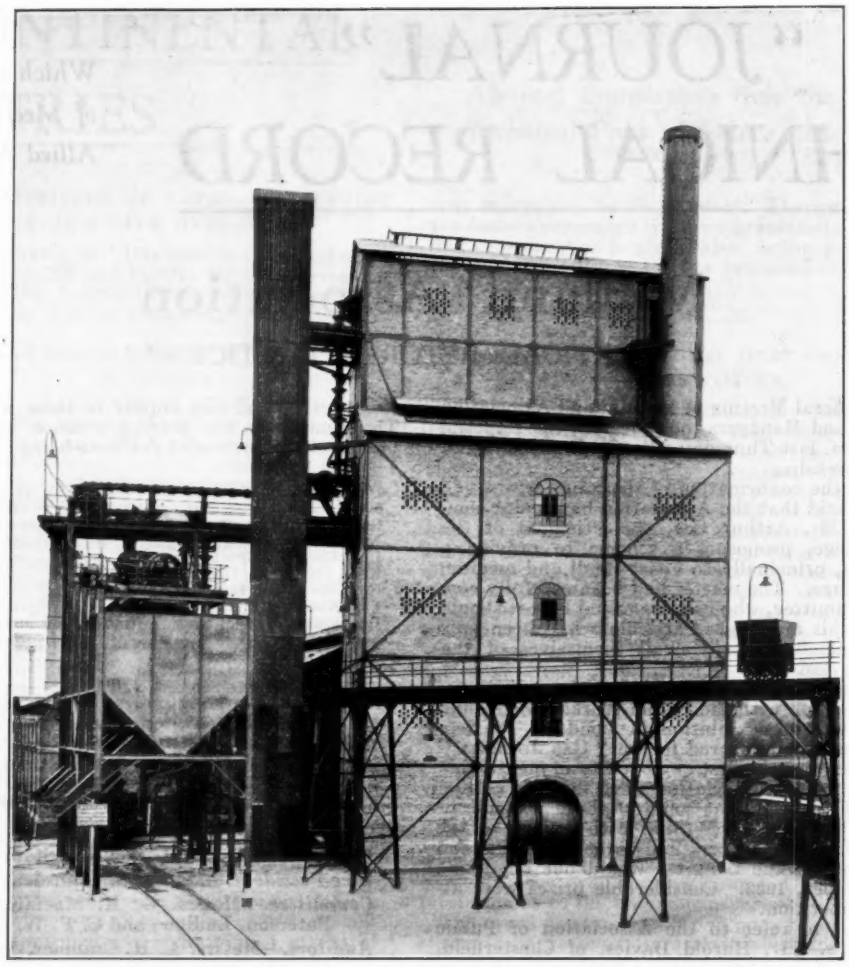


FIG. 1.—EXTERIOR VIEW OF NEW VERTICAL RETORT INSTALLATION.

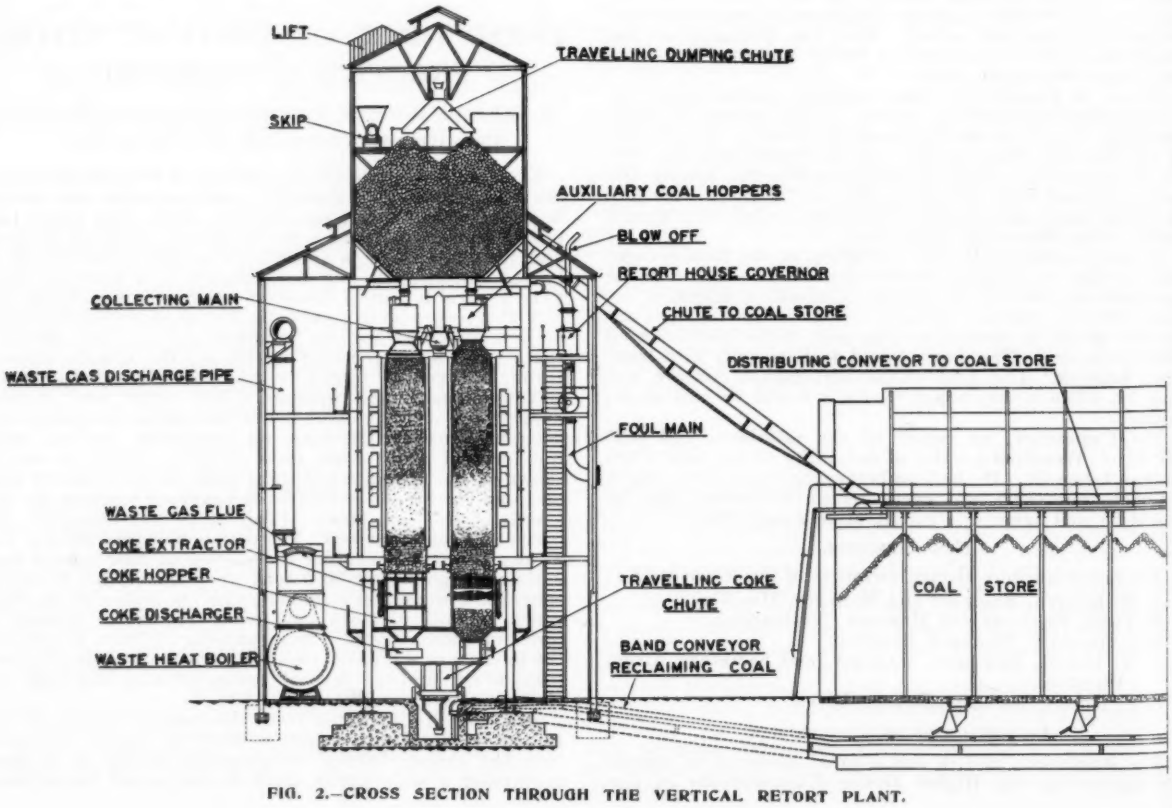


FIG. 2.—CROSS SECTION THROUGH THE VERTICAL RETORT PLANT.

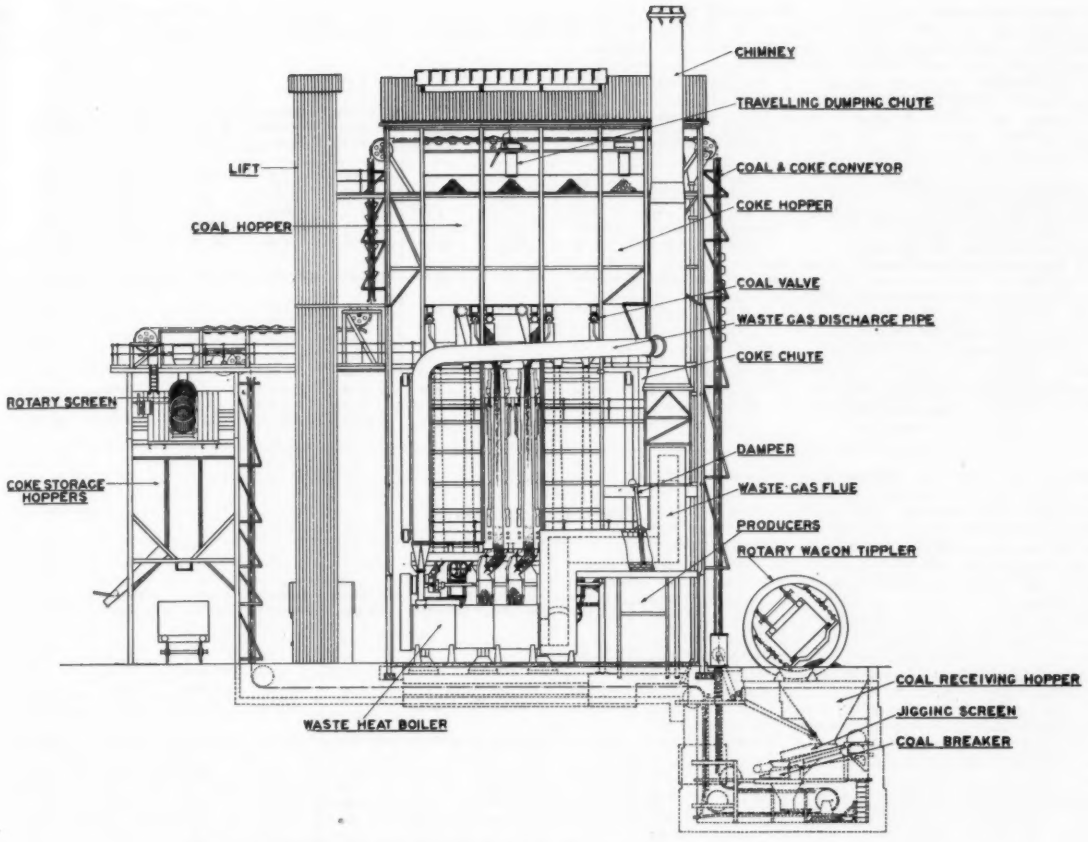


FIG. 3.—LONGITUDINAL SECTION THROUGH THE VERTICAL RETORT PLANT.

it can then be delivered to the rotary screens or storage hopper for supplying the producers.

The producers are so arranged that either one may be shut down without interfering in any way with the working of the other, and provision is also made for the gas from either producer to be taken to any of the heating flues of any of the retorts. The producers are, in addition, fitted with doors, so that in the event of inferior fuel being used they can be worked under pressure and the heats in the setting thus maintained. The waste gases are conveyed to the waste-heat boiler through a brick-lined steel flue, or alternatively discharged into the atmosphere through a brick-lined steel chimney 95 ft. high from the retort house floor level. During the past month dampers have been inserted on each side of the setting to permit of CO being added to the waste gases to augment the production of steam. We are now experimenting with this alteration, and have worked with a boiler inlet temperature of 860° C. and outlet temperature of 350° C.; so far no useful figures are available showing the increase in steam production, but there is a noticeable decrease in the amount of fuel used on the solid fuel boilers.

In the early days of the plant, the average working temperatures of the retorts were tops 1340° C. and bottoms 1175° C. Experience has, however, proved that lower temperatures will considerably lengthen the life of the setting without adversely affecting the make per ton, and we are now working with tops 1300° C. and bottoms 1080° C. to 1100° C.

The retorts are sprayed at each scurfing period, and all have been cold pointed. The CO_2 flue on one side of the bench has been reconstructed in an improved form, and all the retorts appear to be in good condition. The foul gas mains are continuously sprayed with hot liquor to assist in the free travel of tar, and here I may say we have had practically no trouble with stoppages.

Guarantee Figures.

The following guarantee figures were based on using a mixture of:

	P.Ct.
Screened Yorkshire fuel	50
,, Derbyshire ,,	8
Unscreened ,, ,,	8
Screened North Wales fuel	10
,, Staffs. ,,	9
,, South Wales ,,	15

When Producing 460 B.Th.U. Gas.

Throughput per retort per 24 hours	5·72 tons
Gas per ton (corrected to 60° Fahr. and 30 in. mercury), not less than	17,500 c.ft., or 80·5 therms
Dry coke as fuel to the producers per 100 lbs. coal carbonized when all retorts are working, not more than	16·4 lbs.
Coke as discharged available for sale when all retorts are working, not less than	9·25 cwt.
Make of tar per ton of coal	14·0 gallons
Make of sulphate per ton of coal	26·0 lbs.

The mixture of coals given in the guarantee was taken from the fuel actually in use in the horizontal retorts. Experience has, however, proved in our case that Yorkshire washed double nuts with a small percentage of Derbyshire washed nuts give the best results. In order to arrive at this conclusion, I have made a series of tests of fuels from various coalfields, and the following Tables 1 and 2 show the results obtained. Table 1 gives the details of the tests of various coals, while Table 2 gives the gas analysis in each case.

It is our practice to balance up each week in order to keep a close record of the throughput, make per ton, &c. Table 3 gives the make per ton quarterly since the inauguration of the plant, from which you will notice an increase since September last. This is due to the carbonization of the most suitable fuels following the period of coal testing.

Grading of Coke.

When the plant was erected, the sizes of the coke screens were: Breeze, through $\frac{7}{8}$ in.; walnut size, over $\frac{7}{8}$ in. and through $1\frac{3}{8}$ in.; egg size, over $1\frac{3}{8}$ in. and through $2\frac{1}{4}$ in.; large, over $2\frac{1}{4}$ in. It was found, however, that the production of breeze was excessive, and we therefore altered the screens as follows: Breeze, through $\frac{3}{8}$ in.; walnut size, over $\frac{3}{8}$ in. and through $1\frac{1}{4}$ in.; egg size, over $1\frac{1}{4}$ in. and through $2\frac{1}{4}$ in.; large, over $2\frac{1}{4}$ in.

Maintenance.

Since the plant is only three years old there has been no maintenance beyond scurfing and subsequent spraying of the retorts. Retort ironwork has been regularly

TABLE 1.

Test No.	1	2	3	4	5	6	7	8	9	10
Coal	York. Washed Doubles.	York. Washed Doubles.	Derbys. Washed Doubles.	Yorks. Large Nuts.	Yorks. Dry Cleaned Cobbles.	N. Wales. Washed Doubles.	Derbys. Washed Nuts.	N. Staffs. Nuts.	Yorks. Nuts.	Yorks. Cobbles.
Duration of test, hours	120	96	48	72	96	72	48	48	48	48
Tonnage carbonized	171	119	72	94	109	98	60	55	59	65
Throughput per retort per 24 hours	4·9	4·95	6·0	5·17	4·88	6·5	6·0	5·52	5·86	5·4
Gas made per ton, c ft.	20,355	20,630	16,660	16,944	18,073	15,885	16,733	18,768	17,647	18,997
Gas made per ton, therms	93·8	93·2	75·7	79·0	84·0	71·0	75·6	85·0	80·6	85·5
Gas made per retort per 24 hours, c ft.	100,000	102,000	99,000	88,000	88,000	104,000	101,000	103,600	103,500	102 500
Gas made per retort per 24 hours, therms	456	461	452	412	409	466	457	469	473	461
Approximate Percentages Coke Grades — Breeze	15	15	15	10	5	15	10	10	7	10
Walnut size	28	20	30	20	20	20	30	10	13	15
Egg size	28	25	35	50	35	35	35	25	30	15
Large	29	40	20	20	40	30	25	55	50	60
Analysis of Coal — Ash, p.ct.	5·3	4·35	7·4	6·31	4·0	5·6	4·62	3·3	5·06	5·1
Moisture, p ct.	1·3	1·2	3·0	1·03	1·25	1·23	1·88	1·2	1·5	1·2
Volatile, p.ct.	29·45	29·95	32·0	30·7	32·9	30·87	28·38	29·75	29·56	29·95

TABLE 1.—*(continued).*

Test No.	11	12	13	14	15	16	17	18	19	20
Coal	York. Nuts.	Yorks Doubles.	Derbys. Doubles.	Yorks. Doubles.	N. Wales. Doubles.	S. Wales. Nuts.	Derbys. Doubles.	Staffs. Doubles.	Staffs. Doubles.	S. Wales. Nuts.
Duration of test, hours	72	48	48	48	48	48	72	48	72	144
Tonnage carbonized	97	65	67	72	81	76	126	75	114	249
Throughput per retort per 24 hours	4·8	5·68	5·58	5·86	5·8	5·43	5·58	5·26	5·41	5·41
Gas made per ton, c.ft.	19,126	19,540	19,030	18,300	16.541	15,829	18.731	18,666	18,883	17,547
Gas made per ton, therms	86·6	88·9	85·4	82·5	74·4	72·0	85·4	85·0	85·0	79·0
Gas made per retort per 24 hours, c.ft.	91,000	111,000	106,000	107.000	96,000	86 000	104,000	98,000	102.000	95,000
Gas made per retort per 24 hours, therms	415	505	476	483	432	390	474	447	459	427
Approximate Percentages Coke Grades — Breeze	8	5	15	5	5	10	5	5	13	10
Walnut size	20	15	25	20	25	20	10	10	17	20
Egg size	10	15	15	15	20	40	25	40	45	35
Large	62	65	45	60	50	30	60	45	25	35
Analysis of Coal — Ash, p.ct.	3·8	3·1	5·5	4·78	7·0	7·44	3·33	2·0	4·15	7·6
Moisture, p.ct.	1·8	1·0	2·7	2·25	2·4	1·16	2·15	1·84	5·68	1·91
Volatile, p.ct.	30·6	33·1	30·0	27·77	32·78	26·58	31·35	30·00	33·75	25·84

TABLE 2.—*Coal Tests. Gas Analysis. Percentages.*

Test Coal No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Carbon dioxide	3·2	3·6	3 0	3·6	3·7	5·0	4·3	4·1	3·7	3·0	3 0	3·4	4·1	3·1	3·5	3·8	3·2	3·8	3·6	3·7
Oxygen	0·3	0 3	0·4	0·6	0·4	0·5	0·5	0·2	0·5	0·6	0·5	0·6	0·3	0·6	0·2	0·4	0·6	0·5	0·4	0·4
Unsaturated hydrocarbons	1·5	1·5	1·6	1·5	1·7	1·3	1·7	1·2	1·6	1·5	1·3	1·2	1 2	1·2	1·3	2·1	1·6	1·5	1·5	1·6
Carbon monoxide	19 6	17·4	19·9	15·8	13·2	15·6	16·3	15·3	12·2	17·6	18·5	19·2	19·4	18·4	18·0	14 5	18·	17·2	18·9	15·9
Methane	17·9	20·1	18·1	19·7	19 4	16·2	16·2	20·6	20·5	18·6	19·7	18·1	19·5	19·9	15·4	18·3	20·1	16·2	15·9	15·8
Hydrogen	54·8	51 4	53·2	55·5	56·7	57·8	54·8	52·8	50·3	49 9	50·1	49·4	46·5	51·0	53·9	55·4	49·0	55·4	55·0	53·8
Nitrogen	2·7	5·7	3 8	3·3	4 9	3·1	6·2	5·8	11·2	8 8	6·9	8·1	9·0	5·8	7·7	5·5	0·0	5·4	4·7	8·3
Calculated C.V., B.Th.U. per c.ft.	460	465	461	469	465	447	437	459	450	446	453	467	443	458	422	465	467	438	439	426
Total inerts	6 2	9·6	7·2	7·5	9·0	8·6	11·0	10·1	15·4	12 4	10·4	12·1	13·4	9·5	11·4	9·7	9·8	9·7	8·7	12·4

TABLE 3.—*Make per Ton 450 B.Th.U. Gas.*

Quarter Ending—	C.Ft.	Therms.
Sept. 25, 1929	18,012	81·0
Dec. 25, ,,	16,952*	76·3
March 31, 1930	17,869	80·4
June 30, ,,	18,750	84·4
Sept. 30, ,,	18,744	84·3
Dec. 31, ,,	17,953	80·8
March 31, 1931	18,343	82·5
June 30, ,,	17,462*	78·6
Sept. 30, ,,	18,001	81·0
Dec. 31, ,,	18,075	81·3
March 31, 1932	18,415	82·8
June 30, ,,	18,271	82·2
Sept. 30, ,,	19,146	86·1

* Carburetted water gas plant in operation during part of this quarter.

painted, and only very small repairs carried out. Two auxiliary coal hoppers have been purchased, and these permit of others being removed for patching. As regards the gravity-bucket conveyor, we are commencing to renew the buckets over a period of three years, but it may be interesting to know that we are also patching the old buckets. The thin places are burned out by oxy-acetylene to a regular shape and then patched by our own staff; the cost of cutting out and welding in two patches 8½ in. by 5 in. being 4s. 6d.

OPERATING ROUTINE.

The plant is operated by two men per 8-hour shift. These men between them are responsible for the quality and quantity of gas produced, attending to the exhausters, station meter readings, waste-heat boiler inlet and outlet temperatures, elevating coal and coke, and clinkering the producers. A third day man is engaged in greasing, oiling, and cleaning the breaker pit and engine room; he also assists, if necessary, with the shunting of wagons. The mess-room on the operating floor is provided with a telephone which enables the top man to notify the Works Superintendent of any irregular working; this telephone acts for the works after office hours. The vertical plant shift men together with the boilermen are also responsible for attendance at fires on the works until the arrival of the brigade.

WORKING COSTS

Since the introduction of vertical carbonization an interesting comparison of working costs is available. Table 4 gives the figures for the years ended March, 1914, 1929, 1930, 1931, and 1932. The year 1914 is given to show the comparison between pre-war and post-war, while 1929 was the last complete year of horizontal carbonization. A portion of the salary of the Works Superinten-

dent is charged against gas-making costs, as also is a percentage of the wages of the blacksmith, mechanic, and boilermen.

TABLE 4.

EXPENDITURE PER 1000 C.FT. OF GAS SOLD.

—	1914.		1929.		1930.		1931.		1932.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Coal, *less* residuals	0	7·80	1	0·50	1	1·10	1	0·13	1	0·40
Gas oil		..	0	1·10	0	0·35	0	0·12	0	0·27
Gas-making wages	0	3·00	0	5·00	0	2·30	0	1·87	0	1·92
Maintenance of works and plant.	0	4·50	0	5·40	0	4·20	0	3·68	0	3·86
	1	3·30	2	0·50	1	7·95	1	5·80	1	6·45

EXPENDITURE PER THERM SOLD.

—	1914.	1929.	1930.	1931.	1932.
	d.	d.	d.	d.	d.
Coal, *less* residuals	1·74	2·78	2·90	2·69	2·76
Gas oil	..	0·35	0·08	0·03	0·06
Gas-making wages	0·67	1·11	0·51	0·42	0·43
Maintenance of works and plant.	1·00	1·20	0·93	0·82	0·86
	3·41	5·44	4·42	3·96	4·11

If 1929 is compared with 1932 a reduction in working costs of 6·05d. per 1000 c.ft. sold is shown.

The gas, water, and electricity used on the works are noted weekly or monthly, and it is interesting to note the low figure for electricity for power purposes on the vertical plant. Electricity is used for all units except the extractor drive and the turbine of the waste-heat boiler, the weekly consumption varying (according to the time of year) between 170 and 260 units. This consumption includes current used by a capstan and comprsseor motor used each Sunday morning.

I am afraid my short experience of vertical retort practice will not permit of my giving you many other details, but I hope the paper has nevertheless been interesting to the members.

Discussion.

The PRESIDENT, in opening the discussion, thanked Mr. Roberts for a concise and illuminating paper.

Mr. C. M. D. BELTON (Shrewsbury) remarked that, when he saw the installation three years ago, he was greatly impressed with the excellent lay-out and pleasing appearance of the plant. Recently Mr. Roberts had been adding to the work of his waste-heat boiler by means of an auxiliary CO supply, but apparently this had not saved him very much upon the works. A large proportion of the power was supplied electrically, and therefore it would seem that there must be some unusual steam requirements on the works. In his (Mr. Belton's) own case, with a similar size of setting, he was able to maintain the whole of his steam supply from the waste-heat boilers. When reduced to working six retorts, he had been able to augment with CO direct from the producer, but using as few as eight retorts, sufficient steam had been raised without that additional help. He had no electricity; all his power was steam. As to the analyses of coal, and the results, from a study of the figures it would seem that the amount of volatile matter shown by laboratory tests was no guide to the gas-producing qualities of the coal. From the figures, there seemed to be a difference in the steaming efficiencies of the various coals. He congratulated Mr. Roberts upon being able to work the whole of his plant with two men, but at night there should be someone available, in case of need, to attend to the exhauster, &c.

Mr. J. POULSON (Oldbury) also commented upon the excellence of the lay-out, and said that Hereford should be proud to possess such a plant. There were many points in the paper which indicated the modern trend of gas engineering practice. The flexibility of the producers for use with either setting was an important practical advantage, and the under-pressure control arrangements should prove of value in the use of low-grade fuels in the producers. The addition of producer gas to the waste-gas flue, for the production of a further quantity of steam from the waste-heat boiler was interesting, and the experiment had apparently been so far successful. There was, however, the possibility of damage to the waste-heat boiler and the distortion, with consequent leakage, of the flues to the boiler, if this producer gas had not been allowed for in their design.

METALLIZATION OF BOILER TUBES.

With the Glover-West settings, he had found the treatment by metallization of the first 5 in. or 6 in. of the inside of the tubes of the Spencer-Bonecourt type waste-heat boiler had overcome any risk of damage to the tubes by the high inlet temperature—namely, 880° C.—of the waste gases. At Oldbury, the problem of increasing the output from the waste-heat boilers had been overcome in another manner. The walls and tops of the settings, together with the flues to the waste-heat boiler, had been very thoroughly lagged, with the result that the waste-heat boilers produced all the steam for the works. In addition to this, the amount of fuel to the settings had been slightly reduced in this manner.

The temperatures of the retorts were another important factor that Mr. Roberts had mentioned. It was indeed unfortunate that silica materials did not withstand the original top temperatures of 1340° C., for although Mr. Roberts's experiences rightly indicated that lower temperatures increased the length of life of the silica retort, the matter of temperatures had considerable bearing on makes per ton, throughput per retort, extent and efficiency of steaming, and the ultimate composition of the resultant gas. The spraying of hot silica walls gave indication of the spalling of silica at high temperatures; but the systematic spraying of such surfaces with the correct spray materials would greatly mitigate the damage of spalling of retort walls. The results obtained from the plant were of a very satisfactory nature.

COKE GRADING.

Another indication of the manner in which gas engineers were following up the modern requirements of their plant and products was the way in which Mr. Roberts had graded his coke, and made improvements whereby his undertaking would derive considerable financial advantage. The question of smalls in coke was partially controlled by the size of the coal for carbonization, the agglutinant properties of the coal under carbonization, either used alone or mixed with other classes of coal, and the physical strength of the resultant coke. The use of a rotary screen for the grading of coke for small or medium sized works seemed hard to beat.

Mr. FRED DAVIES (Walsall) asked the nature of the material used in cold patching. The carbonizing results were certainly good, but he noticed that a very large proportion of the coal used was Yorkshire, which was more expensive than Derbyshire. He himself used only the latter, and he got last year 81·5 therms per ton, with 10·1 cwt. of coke available for sale. He wondered whether it was worth while going to Yorkshire coal, when results such as these could be obtained from Derbyshire coal. Referring to the smallness of some of the moisture percentages in the approximate analysis of coal, he remarked that approximate analyses did not, in his opinion, serve any useful purpose unless one employed standard methods. At Walsall he used the methods laid down by the Fuel Research Board. Were the samples of gas taken before or after purification, and what were the quantities used?

Mr. G. C. PEARSON (Birmingham) said that it was gratifying to note the way that vertical retorts were behaving at Hereford, where they seemed to have been a great success. Referring to the paper, he did not wish to make criticism, but, looking along the table of results that were given, the first point that struck him was the low total inerts obtained in some of the tests—especially the first, where the figure was 6·2%. It would be interesting if Mr. Roberts were to explain the type of retort house control in use at Hereford. As to the producers, and the remark that they were arranged for pressure working for the use of inferior fuel, he asked if Mr. Roberts had considered the saving to be obtained by using breeze, whereby, if only 3 or 4 tons were used on his works each day, a corresponding weight of large coke would be displaced that could be sold at full value. Speaking of the temperatures of retorts, he did not see any danger whatever in working at the original temperatures quoted, or even higher, and would like to ask Mr. Roberts whether, in view of the lower temperatures now worked, and the gas requiring steaming down to 460, any great quantity of uncracked steam was passing through the retorts. Mr. Belton, of Shrewsbury, had suggested that the use of steam on the works was on the high side. Had this feature anything to do with these temperatures? Referring to the screening of coke, this was no doubt arranged to suit the Hereford district; but ⅜-in. coke could be worked for the smallest breeze, and it appeared to him that the "egg" size, through 2¾ in., was on the large side for domestic fires.

UPWARDLY-HEATED RETORTS.

One must, glancing along the line of coals used for the various tests Mr. Roberts had carried out, be struck with the fact that all the coals were of very good quality, and necessarily expensive. He agreed with Mr. Roberts that this really was necessary for good working with downwardly-heated retorts. While it was possible to use a cheaper grade of coal, such as unscreened coal, the mechanical difficulties that occurred had to be overcome, and the coke in all probability was so hard and dense, and the reactivity so low, that it was difficult to steam down to the required calorific value. It was interesting to note that the modern trend of development of the Woodall-Duckham retorts was on upwardly-heated lines, giving very great improvement in the working of the retorts, and allowing of the use of much poorer coals. The reason for this was seen in a study of the characteristics of the swelling properties of coal. Should the coal be raised to its maximum carbonizing temperature at a rapid rate, then the ultimate swelling that took place was probably several times as great as would be the case should the coal have been raised to the same temperature more gradually. The coal in upwardly-heated retorts was raised more slowly to the maximum temperature, and

thus less swelling took place, and more ease of working resulted, and it was possible to work unscreened rich coals without trouble. The great feature of this was the widening of the area for coal purchases.

Spraying Hot Retorts.

Mr. T. H. Poulson (Stafford) said the author mentioned that the inlet boiler temperature was 860° C., with an outlet temperature of 350° C. The outlet temperature seemed to him rather high. The temperature of the waste gases from his own Glover-West vertical retorts entering the waste-heat boilers was about the same—namely, 850° to 900° C., but the temperature in the smokebox of the boilers was as low as about 200° C. This might perhaps indicate that the capacity of the boiler at Hereford could usefully have been larger. As regarded the spraying of the retorts, he would be interested to know the kind of fire cement used. Personally, he did not much favour the practice of spraying hot retorts. The application of cold liquid to the hot surface appeared to him to be wrong in principle. Turning to the cross-sectional elevation of the plant, it occurred to him that, if a fire got started in the base of the coal bunkers, it might be a rather serious matter and difficult to extinguish—seeing that a common large bunker was used, instead of a number of smaller bunkers. Had the author had any experience of fires? As to the guarantee figures, these were interesting, but perhaps Mr. Roberts could give some of the actual results obtained. For instance, the guarantee figure of 16·4 lbs. of dry coke as fuel fed to the producers per 100 lbs. of coal carbonized seemed somewhat high. The coal hoppers were being patched after only three years' work, and the gravity buckets were now being renewed and patched. This seemed to him a short life. No doubt, in the case of the buckets, the coke was a highly contributory cause to this short life. In his own particular plant he had had auxiliary coal hoppers in use for over ten years, and they were only just showing signs of wear. Looking at Table 4, it seemed that the expenditure per 1000 c.ft. of gas sold was rather high; the cost of coal, less residuals, was over 1s. The corresponding figure at Stafford for 1932 was 7·429d., or about 5d. less than Hereford. Perhaps this was due to the better quality of coal Mr. Roberts was using. In reference to the maintenance of works and plant, one would ask if the figures for 1929 to (say) 1932 were comparative. If no provision had been made for renewal of retorts, then the 1932 figure should be about the same as that for 1929. One was so often trapped in not providing an annual sum for repairs to vertical retorts when they became due.

Ammoniacal Liquor on Producer Grate Bars.

It might be of interest to mention that at Stafford, where they were faced with difficulty in economically disposing of their liquor, they used raw ammoniacal liquor to irrigate the producer grate bars, which were of the open step-grate type. They evaporated in this way about 15 gallons per furnace per hour, or about 15 gallons per ton of coal carbonized—that was, about one-third of the make of liquor. All the liquor from the furnaces was collected, and put over the furnaces again. He (Mr. Poulson) was working with a mixture of 85% Staffordshire coal and 15% Derbyshire, and last year his make was just over 85 therms per ton.

Mr. T. F. E. Rhead (Birmingham) was glad to see that large mixing bunkers had been installed. He was also interested in the statement that producer gas could be sent to any combustion chamber at will, as he considered that there was great scope for improvement in heat control in vertical retorts. He agreed with Mr. Poulson, of Stafford, that spraying hot retorts with wet spray did not appeal to common sense; dry spraying, accompanied by an increased local temperature, was a more promising line to follow.

The Best Efficiency to Aim At.

Concerning the results in Tables 1 and 2, he noticed that some tests had high nitrogen figures, which might be due to erratic "pull" and/or leaky retorts and ironwork. Lower nitrogens would have made it possible to improve the therms per ton and per retort per day. The best efficiency to aim at was that which resulted from the highest therms per retort per day combined with a satisfactory yield per ton—it being assumed that the gas leaving the retorts required no addition of blue water gas beyond that produced in the retort. In this respect it was useful to bear in mind that one of the controlling factors in throughput was the resistance of the charge to the passage of gas and steam up the retort. This, of course, depended on the combined volume (at, say, 1000° C.) of crude gas and steam, and the porosity of the charge. In this connection it was interesting to recall that one had to quadruple the pressure to drive double the volume up the retort. It was thus easy to see how leakage was encouraged if too much gas was being generated. This back pressure often prevented one from getting the maximum throughput which the retort was otherwise capable of carbonizing. In other words, the volatile matter in the coke could not be taken as the only guide to maximum throughput. Two other important factors controlling throughput were the reactivity of the coke to steam and the position of the carbonizing **V** (plastic layer) with respect to the heat zoning. It was significant that a mixture of Yorkshire and some Staffordshire coal gave the best results—no doubt, partly due to the better reactivity of the coke. As regards the carbonizing **V**, it was possible to get this too low down the retort, with the result that the gas liberated lower down got "over-cracked" on its journey to the offtake.

The President, referring to the arrangements for the storage of coal, said he did not know the depth to which Mr. Roberts stored, but he himself had found, owing to the way in which the fines were likely to be distributed, if the coal was stored (say) 20 ft. deep there was great risk of a fire in the coal store. But the author was buying good high-class coal, and the percentage of sulphur was probably quite low, which would tend to nullify the risk of fire. In Birmingham they did not find hot spraying was equally beneficial at all the works. Thus there were differences, even when one tried to co-ordinate all the factors. With the lower heats, were the scurfing periods extended?

The Author's Reply.

Mr. Roberts, dealing with points that had been raised in the discussion, said that the CO augmentation scheme was quite in its infancy, but since it had been in operation the fuel under boilers had been reduced nearly 50%. In some respect his works were scattered, so far as steam requirements were concerned; and although all steam pipes were lagged, there was no doubt a good deal of loss. They used steam for quite a number of purposes, and in the circumstances he had mentioned the waste-heat boiler was unable to give them all they needed. With regard to variation in steaming efficiencies, they had found that some coals did not lend themselves to steaming to the same extent that others did. As to the number of men on the plant at night, there was a boiler man who could if necessary stand by, in the event of the bottom man, whose duty it was to look after the exhauster, being detained.

Up to a point he agreed with Mr. T. Poulson as to possible risk to the boiler and plant by the addition of CO, but before adopting this scheme they went into it very fully with the Woodall-Duckham Company, and their advice was not to exceed a temperature of round about 750° C. at the boiler, and since the printing of the paper they had dropped to about 720° C. Reference had been made to spalling. They had had a certain amount, with the higher temperatures they first worked at.

For cold patching they used "N" cement. Mr. Davies' result of 81·5 therms per ton with all Derbyshire coal was a good figure. Samples of gas were taken after the purification, at the inlet to the holder, and they were taken in samplers, over anything from twelve to twenty-four hours.

They were using a retort house governor, and the pull on the retorts was 1 tenth to 2 tenths, on the average—almost level gauge. The strength of the liquor was about 3° Tw. The whole of the breeze was used under the solid fuel boilers, and then they had had to use coke. Rather than to do this, they had used the coke in the producers. The size of coke suitable for domestic uses was a question of local conditions, and he found that, generally speaking, the schools were taking all the "egg" size he produced. Mr. Pearson had also referred to upwardly-heated retorts, and the fact that they lent themselves to the carbonizing of more difficult fuels. This was quite right.

Reference had been made by Mr. Poulson to the inlet and outlet temperatures at the waste-heat boiler, and he had mentioned that the outlet temperature at Stafford was as low as 200° C. He wondered whether Mr. Poulson had any trouble from condensation. At Hereford, he had been strongly advised not to let the temperature get below 300° C. For hot spraying they were using "S" cement. The coal bunkers were divided into two, and they had had only one experience of a very small fire in the bunkers. On the subject of the guarantee figures, and the actual results obtained, Mr. Poulson had referred specifically to dry coke. His (Mr. Roberts's) average figure was 22·9 lbs. per 100 lbs. of coal—that was, coke as produced. The guarantee figures, particularly as regarded make per ton, were admittedly on the low side. Mr. Poulson had remarked that the expenditure per 1000 c.ft. of gas sold appeared rather high, particularly in the matter of coal. Possibly the difference in transport costs between colliery to Stafford and colliery to Hereford might have some relation to this figure. There was no provision here for repairs; that was shown separately in their accounts. He was interested in the statement regarding the use of raw ammoniacal liquor on the producers. This was an experiment which naturally one would think more about. He congratulated Mr. Poulson on his 85 therms per ton.

Apparently Mr. Rhead did not agree with spraying hot retorts, though Birmingham did it, and what was good enough for Birmingham should be good enough for Hereford. Reference had been made by the President to the coal store, and the fine coal getting into definite layers. Coal was stored to a depth of 15 ft., and they had not found anything of what the President suggested. Scurfing periods had been extended slightly by the use of lower heats.

Mr. James Paterson (Cheltenham) proposed a hearty vote of thanks to Mr. Roberts for his contribution.

Mr. F. C. Briggs (Dudley) seconded the vote. Alluding to the use of ammoniacal liquor on producer furnaces, he remarked that if the waste water went into a river there might be streams of red going down the river. He had tried it. Mr. Roberts lived in a clean town, and his works were worthy of that town. Those of them who had gone over to vertical retorts did not want to go back again to horizontals.

The vote was heartily accorded, and a brief acknowledgment by Mr. Roberts brought the proceedings to a close.

Coke Oven Managers' Association

Presidential Address* by Mr. Geo. T. Purves

At the time of our last annual meeting the trade outlook in our industry was not very promising, and the more hopeful outlook that arose later has been slow in fulfilment.

The expectation entertained earlier in this year of important improvements in the iron and steel industry as a result of the operation of the import duties, together with the favourable exchange, has not yet been realized. This delay in trade improvement has been caused by increased dumping of steel into this country by foreign interests and at very unremunerative figures. In the last calendar year, for every 100 ingot tons produced in this country 70 tons of steel were imported. It is natural that steel importers should make a great effort to retain this market. We have been so long a Free Trade country that some regard our present state as merely flirting with protection, and consider their loss on this steel import justified by their expectation of our possible return to Free Trade conditions. It is further highly probable that the Steel Cartel will be reformed. There was no value in having Great Britain in the last Steel Cartel as our market was free, but now, with Britain a protected country, it is in the interests of foreign producers to establish a Quota position in this country which would be utilizable for negotiation purposes on the possible reformation of the European Steel Cartel, this time, however, possibly including Great Britain. In spite of the delay, however, the improvement will come, and we must look ahead and see how our industry is equipped to meet an increased demand for coke of the necessary quality. The quality factor is one to which we must continue to give the most serious consideration. Our Association, through its representatives on various Coke Research Committees, has continued to take a very active part in investigation work designed to decide what quality of coke is most suitable for the blast furnace, and how best to make such coke. Published reports[1] have shown that many aspects of these problems have been solved. The quality of coke put on the market recently is much higher than it was ten years ago. At one iron works the average test of six months' deliveries of coke from some twenty Midland coking plants was:

	Moisture.	Ash.
1920	8·9%	11·6%
1925	4·9 ,,	9·5 ,,
1932	3·4 ,,	9·0 ,,

This improvement is satisfactory, but the figures for the coke from individual plants are even more striking. Whereas the highest average moisture in 1920 was 13·1%, the highest average in 1932 was only 6·4%, and the corresponding figures for ash were 15·4% and 10·3% respectively.

Coke Required.

Ironmasters have always stated clearly their desire to have dry and low-ash cokes. They have not, however, been so definite on questions of hardness, porosity, and combustibility or reactivity. There has always been an expressed view that the coke should be reasonably free from "smalls," and to-day there is a distinct demand for sized coke brought about by experience with the better riddled cokes from modern plants which all possess really efficient screening equipment. The size of coke now desired can be got direct by screening on modern narrow-oven plants, but the older plants with wide ovens cannot produce such a uniform sized coke without resorting to coke cutting. Experiment has shown that the quantity of coke required to produce one ton of pig iron is reduced when the coke is efficiently screened from pieces below 1 in. cube. It is thus to be expected that the demand for uniform sizing will become more and more insistent. There does not appear to be general agreement as to whether coke should have a high or low reactivity, and little or no consideration is given to porosity. It is, however, established that coke should have a high degree of hardness as measured by, say, its shatter index, and investigation has shown that when carbonizing similar coking fuel the highest shatter-index coke is obtained from top-charged moderately narrow ovens (about 18 in. wide).

Narrow Ovens.

It has thus been clearly shown that narrow ovens working at faster coking times are essential to produce the high-grade coke required, and although a number of such coking plants have been erected in this country, many more will be required to replace the existing wide oven plants if the coming demand for high-quality coke is to be met. It is not within the power of members of this Association to do more than advise in regard to this development, but they have, by the part they have played in coke research during the last few years, done all in their power to show the lines along which development should be made. It is disappointing after the investigation work which has been done in collaboration with representatives of the pig iron industry that practically no effort has been made to arrive at a basis of coke price in relation to coke quality. Since the production of the higher grade cokes which are now demanded must entail greater cost in manufacture, it is clear that failure to arrive at a quality basis of pricing is a factor which will tend to hold back the proper development of the coking industry. If we had agreement to value coke on a quality basis, there would be increased inducement to install more modern equipment and make the higher quality demanded. The necessary investigation

[*Photo. by Elliott & Fry.*

THE PRESIDENT,

G. T. Purves.

Mr. Purves was trained both as a chemist and as a civil engineer at the Royal Technical College, Glasgow, and after several years in the chemical industry, he became Assistant Manager at the Greenock Gas-Works, which post he held for some seven years. Following this, he held in succession the posts of Manager of the Auchengeich Coking Plant of Messrs. James Nimmo & Co., Glasgow; and Manager of the Coking Plant of the Manvers Main Colliery Company. He is at present Manager of the Coking Plants of the Rother Vale Branch of the United Steel Companies. He is also Consultant to the Directors of the United Steel Companies in regard to their other coking and chemical plants. Mr. Purves is an Associate Member of the Institution of Civil Engineers, a Member of the Institution of Chemical Engineers, an Associate of the Institute of Chemistry, a Member of the Society of Chemical Industry, and a Fellow of the Chemical Society. He is a Past-President of the Scottish Junior Gas Association (Western District). In 1915 the Institution of Gas Engineers conferred on him the London Medal. He also obtained, in 1906, the City and Guilds of London Institute's Medal in Honours Gas Engineering. Mr. Purves has published a number of papers on technical subjects.

* Delivered at the Annual General Meeting in London on Oct. 20.

[1] Iron and Steel Industrial Research Council Technical Report No. 1, "Coke for Blast Furnaces."

work to show how this better quality can be made has already been carried out.

The Coal Mines Act, 1930.

Since the passing of the Coal Mines Act, 1930, we have experienced a shortage of coking slack, and many plants, to meet their demands in coke disposals, have had to use dearer classes of coking coal. One company operating coke ovens during the past twelve months was able to provide only 59% of its requirement of coking slack with the output it was permitted to raise. Increased demand for coke will naturally accentuate the position, already difficult, arising from shortage of coking slack, and, with the relative prices of coking fuel and coke which have obtained for some time past, it will be impossible to produce the increased coke required at a profit. It would seem that there is need for an alteration of the terms of the Act which govern provision of coking fuel. Special terms freeing the coking tonnage of collieries operating coke ovens from Quota restrictions do not appear sufficient, and, as matters stand just now, a revival of the pig iron industry bringing increased demand for coke will produce a difficult situation unless the demand for all other classes of coal increases proportionately to that for coking slack, or, alternatively, a substantial amount of the return from a pig iron trade revival would be automatically handed on to the collieries.

Benzole.

The recent increase in the retail price of petrol has been very welcome. It is no exaggeration to say that it is the revenue which has been derived from motor benzole during the last year or two which has kept alive the coking industry. The retail price of petrol is now at a figure at which it is possible to produce synthetic motor fuel from the products of hydrogenation of coal and yield a substantial profit.

Last year, the Imperial Chemical Industries gave considerable publicity to the possibilities of synthetic motor fuel production, and they pointed out that at the price at which petrol was then being retailed—namely, 1s. 4½d. per gallon—it was possible to make synthetic motor fuel with a reasonable profit. It is obvious, therefore, that the position to-day is very much more favourable, and if the retail price of motor spirit be stabilized at anything like the present value we may anticipate big developments in synthetic motor fuel production. The determining factor is the import duty, for the process cannot pay without the maintenance of an import duty.

In the development of the synthetic ammonia industry we saw plants erected throughout the world with a combined capacity far in excess of world requirements, and one result has been that the revenue from ammonium sulphate in our industry has disappeared. With our experience of what happened to market values by the enormous development of the synthetic ammonia industry, we shall naturally be very interested in any large-scale developments of synthetic petrol production. It is almost certain that large-scale experience with the synthetic petrol process would lead to substantial economies, so that we can quite easily conceive that, if the present retail value were stabilized so as to justify development of this industry, the quantity of petrol produced might result in lowering the home market price with consequent reaction against the revenue from our motor benzole.

Surplus Gas Disposal.

This year the Sheffield Gas Company have started laying mains in connection with the South Yorkshire Coke Oven Gas Grid Scheme. As the South Yorkshire coking plants are principally dependent on this project for the disposal of their surplus gas, they naturally wish the scheme every success. Our Association took a prominent part in the inquiry from which this project resulted, and so we must all be very much interested in the scheme. I feel that with synthetic collaboration between the gas producers and the gas distributors, the scheme should be a success. Trade conditions during the last year gave the Sheffield Gas Company very little opportunity of doing new business.

The maintenance of uniform gas quality should present no difficulty on modern plants which are all equipped with satisfactory control mechanism on the gas-production side. The problem of maintaining constant pressure at the consumers' end of the main is more difficult, but for this the distributors are responsible. In the Ruhr Gas Grid scheme high pressures are maintained in the trunk mains, and so the reservoir effect of these mains is very considerable. I understand that the service pressure in the South Yorkshire system is to be only a few inches water gauge. It would seem, therefore, that consumers with large furnace units will require large diameter service mains in their works. This will limit their application of the gas to low-pressure burner systems unless they install local pressure boosting units.

The Company which I serve are putting in their own main between the coke ovens and the steel works. After careful examination of the whole problem, we have decided that, to give the best results from the gas, the service pressure must be several pounds per sq. in. so permitting the use of high-pressure burners.

There are still in some quarters doubts as to the financial advantage of using coke oven gas. This is difficult to understand in face of stated costs for heat production in the form of producer gas. I have made for my own requirement a number of heat balances, and on a well-arranged producer installation I found that at the furnace the total heat in the producer gas could be delivered on full load at 1·11d. per therm. The volume of gas produced being arrived at by a carbon balance, it is obvious that no allowance is made for loss of gas at poking holes, loss in change-over valves, nor by leakage. I am informed that on some plants these losses are very considerable and could easily raise this gas cost to 1·2d. per therm.

There are many uses to which coke oven gas can be put on steel works, each with its own degree of advantage, and most of them are better than the use in the open-hearth furnace. It is of special interest to us to consider further this particular use, for if the use of coke oven gas were extended to all the open-hearth furnaces in South Yorkshire there would not be sufficient surplus gas to go round.

The producer gas is passed through regenerators on its way to the furnace proper, and we see at once the lowest temperature which can theoretically be got at the foot of the checkers will be the temperature of the hot producer gas, some 500° C. In practice, however, the temperature is considerably higher, and on reversal of the regenerators all this heat goes to the chimney. I made a comparative heat balance of the open-hearth furnace working on hot producer gas and a not too modern coke oven battery working on cold coke oven gas, and found the utilizable heat ratio to be 1·4 to 1 in favour of the cold gas. It is interesting to note here that this is confirmed by Dr. Lent,[2] who has found in actual practice that the efficiency of the open-hearth furnace is 40% higher with coke oven gas than with producer gas. From this we see the cost of available heat in the hot producer gas at the furnace is 1·68d. per therm. The modern narrow coke oven produces gas with a heat value of 5·6 therms. We see, therefore, that the utilizable heat in such cold coke oven gas at the open-hearth furnace is worth 9·4d. per 1000 c.ft. In these figures we have taken no account of the week-end and holiday stoppages of the producer plant nor of the advantages of the higher calorific heat of producer and coke oven gas blends, nor the cleaner working conditions, &c. In other words, we have ignored commodity values. Since the gas distributors have the gas pumped into their mains at the required pressure for 5·5d. per 1000 c.ft., there is ample margin for them to make their scheme a great success, and with our knowledge of their past commercial success, we are justified in looking forward to this achievement.

Visit to Messrs. Fraser & Chalmers.

Following their visit on Friday, Oct. 21, to the Beckton Works of the Gas Light and Coke Company—a report of which appeared in the "Journal" last week—the Association, on the Saturday, visited the works of Messrs. Fraser & Chalmers at Erith.

Speaking at a luncheon on the occasion, Mr. J. B. Deakin said that he wished to apologize for the absence of the President of the Association, Mr. Purves, and the Vice-President, Mr. Mordicai, both of whom regretted that they were unable to visit the Erith Works that morning. On behalf of the members present, he wished to thank Messrs. Fraser & Chalmers, Mr. Wilson, and his Staff for their hospitality and for the very enjoyable and instructive visit they had that morning. They were all very interested in the "Chance" sand flotation plant, and very much impressed by the practically theoretical separation of coal and shale which they had witnessed. There were, however, one or two points connected with the process which the demonstration they had just seen did not clear up. One was the water consumption, and another the treatment of fines between, say, $\frac{3}{32}$ and $\frac{1}{8}$ in. The coal they had seen treated appeared to contain approximately 90% above $\frac{1}{4}$ in., and he would be very interested to see a soft coal of a size they normally received at their coke oven washeries treated in the plant.

[2] "Utilization of Coke-Oven Gas in the Iron and Steel Industry," Dr. I. H. Lent, "Gas Journal," Vol. 198, p. 502.

Eastern Counties Gas Managers' Association

The Half-Yearly Meeting of the Eastern Counties Gas Managers' Association was held on Thursday, Oct. 27, in the Board Room of the National Gas Council, 28, Grosvenor Gardens, S.W. 1—Mr. P. D. WALMSLEY, B.Sc., of Great Yarmouth, the President, in the chair.

The minutes of the previous general meeting having been confirmed, the President referred to the loss the Association had sustained in the deaths of the following members: Mr. J. Barton (late of Peterborough), Mr. E. G. Smithard (late of King's Lynn), and Mr. W. Surman (late of Braintree), those present standing for a moment as a mark of respect.

It was unanimously agreed that the Hon. Secretary send letters of sympathy on behalf of the Association to Mr. J. H. Troughton (Newmarket) and Mr. F. A. West (Newark), who were both suffering from illness.

The following new members were then elected to the Association: Mr. G. Dixon, of Nottingham (Member); Mr. C. B. Staniforth, of Gorleston (Associate Member).

DIAPHRAGM GAS GOVERNORS.

By C. BRYAN DONKIN, A.M.I.Mech.E., Assoc.M.Inst.Gas E.

It is now generally recognized that the two essentials for a satisfactory gas supply are constant calorific value and constant pressure. The former is more generally maintained than the latter, and if gas is to keep its place in the public service the question of constant pressure must be dealt with very seriously.

The pressure at which gas is supplied may be obtained by means of a holder, a mechanically-driven booster, or compressors. In all cases governors are necessary, whether fixed at the works or on the district, but the governor will only maintain a constant pressure at one point. Therefore, unless mains and services are fully capable of carrying the gas without serious pressure loss, there must be pressure variations at consumers' premises.

Probably the ideal system would be for every piece of gas apparatus to have its own governor, which would be set to the most efficient pressure, but, until the apparatus manufacturers take this up, the governor fixed at the meter or service pipe gives excellent results, especially as modern houses usually have piping of sufficient size.

The cost of installing such governors is often urged against such a scheme, but this cost need not be great, and the satisfactory service given will often retain a consumer who otherwise might go over to electricity.

The governor is a piece of apparatus for reducing pressure and maintaining that reduced pressure constant. It cannot increase pressure, so that where pressures are already too low it is useless to install governors without first increasing the pressure by boosting or increased holder pressure.

The conditions of pressures vary so much that it is not possible to design a single governor which will function at any inlet or outlet pressure, and it is the writer's intention, therefore, to describe some of the numerous forms the governor can take in order to deal with various conditions.

GOVERNORS FOR INDIVIDUAL APPLIANCES.

Dealing first with small governors designed for individual apparatus, as the inlet pressure variations are usually not great a simple single valve governor meets the case. Such governors have been found very useful for fitting to geysers where a maintenance scheme is in operation, as they ensure the efficient working of the apparatus and prevent sooting-up in the event of a rise in pressure.

A smaller governor on the same lines is suitable for gas fires, lamps, cookers, &c.

In these governors a single unbalanced valve is used. This valve is suspended direct from the diaphragm, and is leather covered to ensure gas-tightness when closed. It works efficiently with inlet pressures up to 10 in., the outlet being about 3 in.

The meter regulator is of similar design, and is usually fitted with a cap and liner for attachment to the meter, or screwed for fitting into the iron service pipe. Provided the house piping is large enough the meter regulator will ensure that, once the lighting burners, fires, &c., are set, they will give a constant and satisfactory service without adjustment; and complaints of so-called "bad gas" will not be heard.

For higher inlet pressures a balanced valve is essential, as large variations of inlet pressure will affect the outlet pressure. The double seating valve is very difficult to make gas-tight in small sizes, but a single valve balanced by a small diaphragm gives excellent results up to 2 lbs. inlet pressure. A governor of this type will maintain a perfectly constant outlet pressure under all conditions of consumption and variations of inlet pressure, and meets all the requirements of low pressure and boosting up to 2 lbs.

GOVERNORS FOR HIGH PRESSURES.

High-pressure distribution using pressures up to 50 lbs. or more requires another type of governor in which the valve is very small in relation to the diaphragm area, and its movement is geared down by a lever, so that quite large variations of inlet pressure do not affect the outlet pressure. In this way high pressures can be reduced in one stage.

It sometimes happens that in a high-pressure scheme the high pressure is not on all the time, so that the governor is required to function at times with holder pressures, This means that the valve has to be enlarged and balanced, and this type is called the combined high-low pressure type.

One of the troubles met with in high-pressure distribution is dust, chiefly iron oxide from the mains. This can be dealt with to a great extent by boxes containing gauze or by fitting gauze in the governors, but convenient means must be provided for removing this dust periodically. Dust may also settle on the valves of high-pressure governors and cause leakage, and a mercury seal is frequently arranged as part of the governor or as a separate unit, to blow off at a predetermined pressure.

DISTRICT AND STATION GOVERNORS.

The governors so far described are of the consumers' or service type, but they can be modified and increased in size to act as district and station governors.

In larger sizes, 6 in. and over, a double seating valve can be used satisfactorily, and governors of this type have been made up to 48 in. diameter for low-pressure district and station work.

The high-pressure district governor is a different problem, and to secure proper control over the high pressures a relay system has to be used. This has frequently been described, and consists essentially of an auxiliary governor controlling the pressure under a bowl, which in turn operates the main governor. With this system a perfectly constant pressure of a few inches can be maintained with varying inlet pressures up to 100 lbs. and varying volumes, also a dead tight shut-off.

In certain cases high outlet pressure governors are necessary in order to reduce high pressures to 1 lb. or more. In these cases a special governor operated by pistons is employed, the diaphragms only being used to prevent gas leakage. This type of governor is often used to supply high-pressure lamps from a main at a higher pressure.

While on the subject of high pressures, it may be mentioned that a special governor is used on gas driven motor vehicles to reduce pressures as high as 3000 lbs. down to atmosphere.

Another interesting form of governor is that of the automatic by-pass used in conjunction with fan boosters fixed on a district main. In this case the outlet pressure acts under the diaphragm, and the inlet pressure above the diaphragm. As long as the outlet pressure is greater than that on the inlet the governor remains closed, but should the booster stop and the outlet pressure fall to the level of the inlet the governor opens and by-passes the booster.

Fan boosters have recently been installed on the outlet of purifiers in order to relieve back pressure. In this case a diaphragm governor is arranged on the booster inlet to maintain a pressure of 5 tenths on the purifiers, the fans running at a constant speed independent of the volume passing. The same arrangement can be adopted to prevent the holder crown being drawn in by boosting fans.

Diaphragm governors may also be arranged to regulate the speed of engines and turbines driving compressors and boosters, and to regulate the automatic filling of storage tanks and Hortonspheres.

In cases where district governors are fixed in pits underground, they may be loaded by air or gas pressure from a small kiosk situated above ground, so that pressures may be altered conveniently. A similar device may be operated by clockwork in order to increase pressures at times of maximum consumption.

Attempts have been made to obtain an automatic increase of the set outlet pressure of a governor as the volume increases, in order to compensate for the loss of pressure in service piping at large volumes. This has

been done by forming the outlet of the governor as a venturi tube, thus converting velocity into pressure. It has been found, however, to be of little practical use, as the volume required to be passed to obtain the increase is more than the capacity of the meter, so that in practice the point where the increase takes place is never reached.

The outlet pressure at which a governor is to work has as great a bearing on its design as the inlet pressure, for the higher the outlet pressure required the greater is the weight required to balance it, so that a diaphragm of a certain area can only be used for a certain pressure range. For increased pressures the area must be reduced.

Another point is the eddy effect set up by the gas rushing through the governor valve, and a considerable amount of experimental work has been carried out in order to overcome the troubles caused.

It will be seen from the above remarks that the designing of a governor is not as simple a matter as it at first appears to be, and the writer hopes that these notes will make clear in some measure the reasons for the various designs of governor to meet different conditions.

Discussion.

Mr. A. W. SUMNER (Ipswich) remarked that gas engineers as a whole had not taken very kindly to governors on services, due to the fact that they mostly suffered from low pressures in their mains rather than high pressures. If they looked at the distribution of gas in the proper light, it would be seen that they should use higher pressures in their mains, together with governors. They would then make greater use of their mains, and they need not be so large. The question of leakage would not enter into the matter, for with high-pressure working the main-layers and service-layers would be much more careful in making their joints. He went on to mention his own experience of high-pressure work in the Grays and outer areas, where they really did obtain a constant supply. Here they had fixed governors on the outlet of the high-pressure mains to the services, adjusted to give a pressure of 4 in. W.G. at the meter, which met the requirements of householders. He had never introduced it for low-pressure work because it was difficult to maintain the higher pressures required to make the governor operate satisfactorily. It was time that the Gas Industry as a whole looked into the question of utilizing governors for service work. He knew that the makers of the governors were looking into the matter very closely, and they were urging him to adopt them for different purposes in the house. He had decided to try certain governors on apparatus in his own home, in order to see if there was any difficulty involved in the use of individual governors. It might very likely result in an improved supply.

The PRESIDENT in this connection remarked that the gas supply to his house had been governed for several years, and he found it very satisfactory and a great improvement during periods of varying pressures.

Dr. E. W. STEWART (Sigma Instrument Company, Letchworth) asked what was the least pressure necessary to work the governor. He had experimented with a small governor, and with a double-seated valve one could get it very near to the pressure one wanted the governor to throw. If governors were to be used extensively there should not be a large pressure drop in the governor itself. He inquired if the use of a by-pass governor did not involve large loss of power in the booster. Could not some other form of governor be adopted in cases such as this?

Mr. W. GROGONO (Croydon) asked for further details of the governors on gas-driven motor vehicles.

Mr. B. CLARKE (Stamford) asked if Mr. Donkin could tell them of any experience he had had of a diaphragm governor being used as a safety governor for the town pressure.

Mr. A. C. HOVEY (President of the North of England Gas Managers' Association) said that he was very pleased to be present at their meeting on that occasion. Twenty years ago he was able to order governing apparatus from the Bryan-Donkin Company, and put in various details which at that time were quite new. One was the gauze arrangement for preventing dust from getting on the seatings of the governor valves. In all high-pressure work the interior of all pipes and mains should be carefully cleaned and coated. Prevention was better than cure. With the high speed that gas travelled, if there was anything in the nature of loose dust or rust in the pipes it would cause difficulty. He inquired what the seating of the governors was composed of generally, and whether there was anything transpiring in reference to the scoring of the valves at very high pressures. In regard to the internal dust problem, they ordered a paraffin spray apparatus, which was very satisfactory, and they had had no further trouble since it was started fifteen years ago. He considered that the arrangements which could be adopted to prevent the holder crown being drawn in were very useful, for he had known cases of the holder crown being drawn in. He referred to the history of the Bryan-Donkin firm, which, he said, was most interesting. He had discovered that Donkin was a Fellow of the Royal Society, and pioneer in many ways.

Mr. T. V. JOHNS (Lowestoft) said that the question of pressure was a very important one, and they ought to be thankful to the pioneers who had developed the use of governors in the Industry. He was interested in Mr. Grogono's question in regard to the governors for gas at exceedingly high pressures, and they all hoped that these would become a useful asset to the sales of gas in industry. Mr. Donkin had said that there were two essentials for a satisfactory gas supply—namely, constant calorific value and constant pressure; but they must not overlook the composition of the gas also, as this was one of the main things they were concentrating on these days. In this connection he inquired if the specific gravity of the gas had any bearing on the matter of governing.

Mr. F. N. HOWES (Chelmsford), proposing a vote of thanks to Mr. Donkin for his paper, said that he considered the ideal system to be the absence of the domestic governor entirely. He would prefer to have no governors beyond the station governor, though he realized that, to ensure the efficient operation of appliances governors had to be used under present conditions.

Mr. S. HANDS (Sleaford) seconded the vote of thanks, which was carried unanimously.

The Author's Reply.

Mr. C. BRYAN DONKIN, replying to Dr. Stewart's query regarding the pressure difference between the inlet and the outlet of the governor, said that about two or three tenths should be sufficient to obtain a good governing line. Below that one might meet with small variations. The by-pass governor was not to regulate the volume being passed by the booster. The by-pass remained closed when the booster was working, and open when the booster stopped. The best way to govern the volume was by throttling. In reply to Mr. Grogono, he said that the design of the governor for gas-driven motor vehicles was not entirely settled yet. One they had at work on a motor-'bus at Chelmsford was a two-stage governor. The first stage reduced the pressure from 3000 lbs. per sq. in. to 15 lbs., and the second stage consisted of a small diaphragm to reduce the 15 lbs. pressure to somewhere about two or three inches of vacuum, as created by the suction from the engine. There was another type of governor for use in this kind of work—namely, a three-stage apparatus, the first two stages being operated by pistons and the last one by a diaphragm. This had, in addition, an oil-pressure relay valve worked by the oil pressure in the engine. Normally the main governor remained tight, and as soon as the engine was started the oil pressure automatically opened the governor. One of the main difficulties was to get the valve to hold tight 3000 lbs. pressure and yet to open with only a small amount of suction. There was no standardized governor at the moment, though various experiments were being made to fix upon a design. In regard to Mr. Clarke's question as to the diaphragm governor being used as a safety governor, this was being done at Stratford-on-Avon, where a 6-in. governor had been in use for two years, with satisfaction.

In reply to Mr. Hovey's question in regard to the seating of the governor valve, Mr. Donkin stated that this consisted of a leather seat and the valve had a knife-edge in the case of high-pressure work, while for low-pressure work they utilized a spherical valve covered with leather. The leather rings for high-pressure were so made that they could be renewed if they became worn. The reason for the leather and knife-edge was that, if there should be any dust on the valve seating, the knife-edge would press it into the leather, thereby maintaining the gas-tightness of the valve. In regard to the holder crown being drawn in, a governor for this work was very satisfactory. In reply to Mr. Johns' question as to whether the specific gravity of the gas had any effect on the governor, Mr. Donkin said that changes in the specific gravity of the gas supplied were so small that they had no appreciable effect on the governor.

Continuing with the business of the meeting, Mr. W. GROGONO proposed, and Mr. F. PRENTICE seconded, that Mr. P. D. Walmsley be nominated as the representative of the Eastern Counties Association on the Council of the Institution of Gas Engineers. This was unanimously agreed to.

The New President.

Mr. WALMSLEY then proposed that Mr. Grogono be elected President of the Association for the next year. He was sure that Mr. Grogono would make an excellent President, and he hoped he would have a very successful year of office.

Mr. J. W. AUCHTERLONIE (Cambridge) seconded this resolution, which was carried unanimously.

Mr. GROGONO returned thanks for his election, and said that he would do his best to carry on the good work and try to follow in the footsteps of those who had gone before him. He would, however, appeal to all the members of the Association to assist him during his year of office; and he emphasized the necessity of members coming forward with offers to read papers.

Mr. A. GREGORY (Harwich) proposed, and Mr. W. J. MASON (St. Ives) seconded, the election of Mr. F. G. Brockway (Cleethorpes) to the Vice-Presidency of the Association.

Mr. BROCKWAY briefly acknowledged.

Two vacancies on the Committee were filled by the elections of Mr. T. V. Johns (Lowestoft) and Mr. F. N. Howes (Chelmsford), on the proposition of Mr. W. J. MASON, seconded by Mr. F. YOUNG (Skegness).

The Hon. Auditors of the Association, Mr. G. A. Mallet (Ipswich) and Mr. W. S. Venner (Brentwood), were duly re-

elected on the proposition of Mr. F. PRENTICE, seconded by Mr. C. G. GRIMWOOD (Sudbury).

The PRESIDENT proposed the re-election of the Hon. Secretary and Treasurer (Mr. W. C. Chapman, of Boston) for the ensuing year, and paid tribute to the work he had done for the Association.

This was seconded by Mr. E. F. KEABLE (Great Yarmouth) and Mr. CHAPMAN briefly returned thanks, saying that he would continue to do his best in the interests of the Association.

Mr. Keable was re-elected Secretary of the Eastern District Gas Education Committee of the Institution of Gas Engineers.

INSTITUTION BENEVOLENT FUND.

The PRESIDENT took the opportunity of appealing for greater support by members to the Institution of Gas Engineers' Benevolent Fund. He drew attention to the value of the scheme, and said that he believed most of their members were already subscribers, but would ask those who were not to give the matter their consideration.

PRESENTATION TO MR. KEABLE.

The PRESIDENT then made a presentation of a wallet containing Treasury Notes to Mr. Keable upon his retirement from the post of Hon. Secretary and Treasurer of the Association. The work in connection with this office, he said, was by no means light, for a great deal of time, care, and tact was required. Mr. Keable had filled the office for four years, during which period he had done a very considerable amount of work, and the Association felt that this should be recognized in a tangible form. In all these cases it was not the intrinsic value of the gift which mattered so much as what it meant to the recipient. He read a letter of appreciation from the Association to Mr. Keable, and said that on behalf of every member he had great pleasure in handing Mr. Keable this wallet of Treasury Notes as a slight recognition of the work he had done for them in the past.

Mr. KEABLE, in returning thanks for the presentation, recorded his appreciation of the help the Past-Presidents, Committee, and members had so kindly rendered him during the whole of his term of office. Whatever the wallet contained, he said, it could not contain a greater gem than the feelings he knew the members of the Association had for him. He acknowledged the support given by his Chairman, Mr. Henry Woodall, and paid a tribute to the Technical Press for many courtesies rendered. "We have in our Technical Press," he added, "a body we have a right to be proud of, and I think that no engineering organization has a finer Technical Press than we have in the Gas Industry."

THE NEXT MEETING.

Mr. GROGONO invited the Association to hold their next meeting in Croydon some time in May next, the exact date to be announced later.

The PRESIDENT said that their thanks were due to Mr. Grogono for so kindly inviting them to Croydon, and he was sure they would have a most profitable and enjoyable meeting there.

ALTERATION OF RULE.

It was agreed to alter the wording of Rule 15 in order to make it quite clear that the nomination forms of applicants seeking election to the Association must bear the signatures of a proposer and a seconder, both of whom shall be members of the Association.

The PRESIDENT said that increasing difficulty was being experienced in finding members to read papers, and in this connection he appealed particularly to the younger members to come forward and contribute to their proceedings.

THE EASTERN COUNTIES BENEVOLENT FUND.

Mr. F. PRENTICE said that he had a very pleasant announcement to make. They had just heard what their President had said regarding the Benevolent Fund of the Institution of Gas Engineers, which had struck a responsive chord in their hearts. Some time ago, however, they had started, in connection with the Eastern Counties Association, a small Benevolent Fund of their own, which at the moment had a sum standing at its credit amounting to £81. That might sound a small figure, but it might prove a very useful sum in certain circumstances, and he now had to announce that Mr. William Jones, who had started off the Fund in the first place with a donation of £50, had offered another £25.

The PRESIDENT said that they were very grateful to Mr. Jones for his handsome contribution to this Fund, and he knew he was voicing the feelings of every one present when he expressed the hope that they would see Mr. Jones with them for many years to come.

Mr. WILLIAM JONES thanked them for the kind remarks that had been made, and this terminated the business of the meeting.

Scottish Junior Gas Association (Western District)

Carbonizing Plant at the Dalmarnock Gas-Works

The Opening Meeting of the Twenty-Ninth Session of the Association was held in the Royal Technical College, Glasgow, on Oct. 8. Mr. A. MACDONALD, the Retiring President was in the chair.

The CHAIRMAN congratulated the three members who gained the Diploma of the Institution this year: Mr. A. Tran, Coatbridge, Mr. J. Webster, Port-Glasgow, both in Gas Engineering; and Mr. A. Bujnowski in Gas Supply.

Mr. MACDONALD then introduced Mr. Samuel McGown, and called on him to read his Presidential Address.

PRESIDENTIAL ADDRESS

of SAMUEL MCGOWN.

[EXTRACT.]

The Gas Industry is at present, in common with every other industry, feeling the effects of a world-wide depression in trade. This depression, together with the increasing menace from electrical competition, makes it imperative that, in addition to finding new outlets for our primary product, we must consolidate our present position. It is interesting to note that increasing attention is being paid to the lighting load, particularly to street lighting, as in my opinion street lighting by gas, when properly carried out, is one of the best advertisements our Industry can have.

The salesman's task is made much easier where he has a cheap therm for sale, and he can be assisted greatly by the adoption of two-part tariffs. The adoption of these tariffs will have to become more general to compete with the low price at which electricity is sometimes sold.

Carbonizing plant has now reached a high degree of efficiency, and much assistance in the production of a cheaper therm cannot be looked for in this direction. A uniform calorific value throughout the country would assist the makers of appliances greatly, but unfortunately due to variations in the value of coke and residuals, and also to the situation of the works and type of plant employed, the calorific value at which it is most economical to manufacture gas varies greatly. At the present time we have declared calorific values ranging from 200 to 600 B.Th.U. per c.ft.

Our bye-products which formerly assisted greatly in the production of a cheap therm are also affected by the present depression. Sulphate of ammonia, due to the competition from the synthetic product, is in most concerns now worked at a loss and the future does not look any brighter.

The recent increase of 3d. per gallon on the price of petrol turns our thoughts to the recovery of benzole either from the tar or by washing the gas. I look for some developments in this direction.

In Glasgow it is being found increasingly difficult to dispose of our coke. The low-temperature industry is not progressing, due chiefly to the high price asked for the smokeless fuel, and it is here that the Gas Industry should step in and develop the large potential market. By using suitable low-ash coals and supplying the ordinary domestic consumer with a properly graded and low-moisture fuel, each undertaking should be enabled to sell all its coke locally.

The Institution of Gas Engineers' Education Scheme is progressing favourably with an increasing number of candidates presenting themselves for examination each year. I was particularly pleased to note the number of successes among our own members during the past year. I hope that their success will be an inducement to other members to follow the scheme.

CARBONIZING PLANT AT DALMARNOCK GAS-WORKS.

The retort settings are of the Wilson (Glasgow) continuous-intermittent type. This system was designed by the late General Manager of Glasgow to carbonize the typical Scotch coals, and has been working very satisfactorily at Dalmarnock for the past 17 years.

The plant consists of 6 benches each of 40 retorts, the

retorts being built in ovens of ten with a producer to each oven. The nominal throughput is 2½ tons of coal per retort per day.

The retorts are 23 ft. long, rectangular in section. The top dimensions are 40 in. by 10 in., and extend to 48 in. by 18 in. at 8 ft. 9 in. from the top, and thence are parallel—that is, the taper is all on the top third of their height. On two of the benches the experiment was tried of tapering the retorts all the way from top to bottom. This was found to have beneficial results in reducing the number of "hangers."

The dimensions of the producers differ on each of the three sections. On the most recently completed section the height of the producers is 32 ft. from the bars, and the sections 5 ft. 2 in. by 9 ft., giving a grate area of 46½ sq. ft. or approximately 2 sq. ft. per ton of coal carbonized. In No. 2 section the producer dimensions are 4 ft. 6 in. by 9 ft. by 19 ft. high from the bars. These producers are raised 13 ft. above the floor level to assist in the discharge of clinker and ashes, which are discharged through chutes in the floor direct into bogies, so minimizing handling. The saving in labour is negligible, and the regeneration of the waste gases suffers due to the shorter run in the regenerator so that in the latest completed section the producers are at ground level.

The producers are clinkered every 48 hours, the fire bars being shaken on alternate days. The steam to the producers is kept at 8 lbs./sq.in., and we find that reducing this pressure results in an excessive formation of clinker, which, in addition to its deleterious effect on the producer gas, makes the task of clinkering much more arduous.

The producer gas enters the oven at the top of the bench where it meets the secondary air which has been heated to 600°-800° C. by passing through the regenerators. The gases have then a staggered travel down through the flues surrounding the retorts. The ten retorts comprising the oven are set in two's, so that six flues are necessary to heat each side of the retorts. No provision is made for the admission of an auxiliary supply of air or producer gas so that any advantage that may be derived from heat zoning is lost. The heats on the Wilson system are usually about 100° C. higher at the top of the retorts than at the bottom, and if for any reason a high bottom temperature was desired it cannot be obtained without correspondingly raising the top temperature. A bench under good working conditions gives an average temperature of 1100° C. at the top and 1000° C. at the bottom of the retorts.

Bench No. 5 is heated by means of 230 B.Th.U. gas from the Maclaurin plant, and the temperatures of this bench are found to be more uniform than in the coke-fired benches due no doubt to the constancy in the gas analysis, the variations caused by clinkering and cleaning being obviated. Bench No. 6 can either be heated by Maclaurin gas or producer gas, the pipes conveying the Maclaurin gas to this bench entering the producer gas flues so that to change over from producer gas firing to Maclaurin gas is a simple matter. I do not intend discussing this system of heating the retorts as it has already been fully described to us by Mr. McFarlane in his Thesis which he read on Jan. 25, 1930. [See "JOURNAL," Vol. 189, p. 383.]

RETORT CHARGING.

The charging of the retorts, which, of course, is intermittent, takes place at 6-hourly periods. Formerly it was our practice to use 5-hour charging periods, but we find that the longer charge results in an increased make per ton, with a higher thermal yield per ton and a decreased fuel consumption for heating the retorts, although the throughput of the plant falls. I cannot translate these advantages financially, but give average figures for both periods of charging.

—	Five Hours' Charge.	Six Hours' Charge.
Throughput of coal per retort per day	50 cwt.	45 cwt.
Gas made per ton	15,450 c.ft.	16,300 c.ft.
C.V. of gas, B.Th.U.	472	472
Therms per ton	72·9	76·9
Fuel to producers, cwt. per ton	3½	3
Steam pressure on retorts, lbs. per sq. in.	11	13
Therms per retort per day	182·2	173·1

COKE.

The coke is withdrawn from the bottom of the retort by opening the cradle, which is sealed in water and supports the weight of material in the retort, by means of hydraulic rams. The coke is discharged into a bogey which holds approximately 6 cwt. of coke. When the bogey is full the charge in the retort is resting on the coke in the bogey. The cradle is then closed shearing the column of coke.

The bogies are then hauled to the end of the retort house by small steam locomotives and are discharged by

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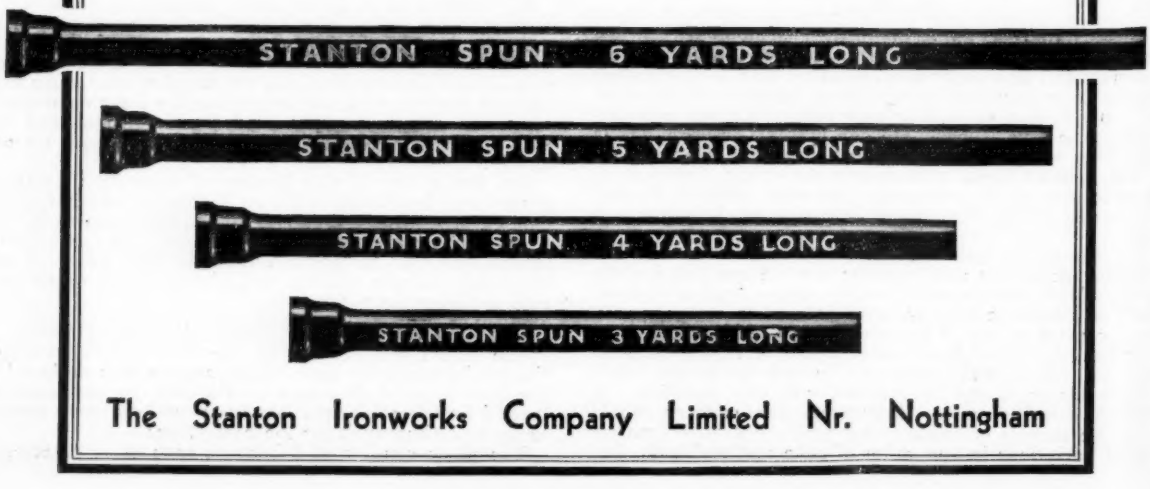


The Stanton Ironworks Company Limited Nr. Nottingham

means of their side-opening doors into the telpher skip which is lowered into a pit. The coke as discharged is already cooled by the steam admitted to the retorts, but to obviate any danger of fire when it is elevated to the bunkers, it is further quenched by water sprays fitted around the telpher pit. The coke is then elevated by means of the telpher crane and conveyed to the screens over the storage hoppers. These storage hoppers are of reinforced concrete and have a capacity of 2000 tons with separate sections for riddled coke, riddled breeze, and fine breeze.

The coke is screened by means of a rotary screen driven by a motor, and is divided into the following grades:

Riddled coke	Above 1 in.
Riddled breeze	⅜ in.–1 in.
Fine breeze	Below ⅜ in.

From the bunkers the coke is discharged by gravity into carts or wagons. The telpher crane also handles coke to the storage heap, and can be used either for depositing coke by means of the ordinary coke skip or for lifting coke by substituting the skip with a grab. Coke by this means can be stocked up to the height of the telpher track, which at Dalmarnock is 64 ft. above the ground level.

Gas.

The gas leaving the retorts passes through a liquor seal of about ½ in. in the hydraulic main and enters the foul main by means of a 14-in. pipe. There is a separate 14-in. pipe from each oven. The offtake pipes from each retort are flanged, and the flanges carry cast-steel serrated cones, the diameter of the cone being equal to the inside diameter of the offtake pipe, by means of which each pipe is cleaned twice daily. The offtake pipes, which were previously 4-in. diameter, have now been increased to 7 in. with beneficial results in that there are fewer stopped pipes and the pressure on the top of the retorts is reduced.

The liquor level in the hydraulic main is regulated by means of weir valves on the tops of the tar towers, there being a tar tower to each oven. These tar towers are 4 ft. 6 in. square in section and 6 ft. 6 in. high, and are capable of holding 48 hours' make of tar so that they require to be run off every second day. As the tar is run off from the bottom of the tar tower liquor is run in at the top.

Each bench is governed separately by means of Cowan's retort house governors. About six-tenths pull is maintained at the end of the foul main, giving approximately level gauge at the retorts.

Discussion.

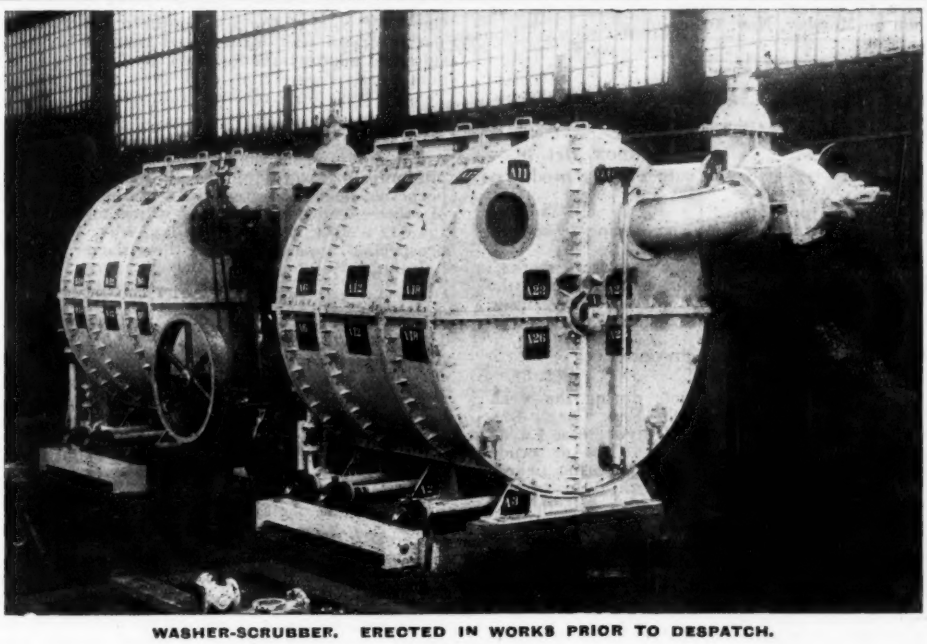
Mr. McDonald said that a two-part tariff was a method of helping the Industry in its fight, but unfortunately it was difficult to introduce.

Mr. W. Campbell (Helensburgh) remarked that cheap gas in the holder did not mean cheap gas for sale. The efficiency of the carbonization plant was not the chief factor which went towards the sale of cheap gas. Capital charges were most important. In regard to the standardization of calorific values, he doubted whether this would help the manufacturers to supply gas appliances without gas or air regulators. It would, however, assist the gas undertakings to sell their consumers appliances of a definite rated value. They could then supply apparatus and state what it would consume, and give figures the man in the street could understand.

Mr. R. A. MacLaren (Newton-on-Ayr) expressed the opinion that electricity could not compete on cost. He thought that Mr. McGown's point about making benzole was good, but it offered the objection that small works had small quantities and could not run continuously. With regard to the sale of coke, it could not compete with anthracite, even though the latter was higher priced.

Mr. Frazer (Manager, Dalmarnock) spoke on the question of the cheap therm. Interest on capital was at the core of the matter. They had to bear in mind that to-day they were only getting one-third of the price of tar they used to get, and that made a difference of about 1d. per therm.

Mr. McGown, in reply, on the question of the two-part tariff said his idea was that at the present time they were selling gas as cheaply as possible; but by increasing the output the price of the therm could be greatly reduced. In many works about 50% of the plant lay dormant in summer. If a new load, such as water heating, could be developed in order to bring this plant into use, the gas for this summer load could be sold at advantageous terms. He doubted whether retort house efficiency could be improved much, or whether the thermal efficiency of gas manufacture could be increased by more than 1-2% on the figures at present obtained. As regards appliances, he did suggest fitting appliances without regulators, because in the hands of the consumer the use of these was abused. He also agreed that a denser coke was required to compete with anthracite; but the Continental buyers looked for a light coke, and it was difficult to produce a coke to suit both markets.



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GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The uncertainty brought about by the fluctuations in the exchange value of sterling led to a marked falling off in the volume of business on the Stock Exchange last week. There were no signs, however, of any liquidation, and the underlying strength of the position is evidenced by the prompt support given at the lower levels on any small reaction in prices.

Gas stocks and shares were unaffected by any outside influences, and the market maintained its former display of strength. A number of issues recorded large appreciations in value, and among these the most spectacular was a rise of 30 points in Derby consolidated to 155 (on the Nottingham Exchange), followed by a gain of 20 points in British 7% preference to 145, business being done at this price. Increases of 10 points each occurred in Brighton 6% preference to 140, and Mid-Southern Utility 5% debenture to 117½, while several others gained from 5 to 8 points.

At the present time very few debenture stocks in the list yield much over 4%, and there are some giving a return below this figure, but the preference shares of some of the larger Suburban and Provincial undertakings are still attractive at current prices—*e.g.*, Tottenham 5½% at 122½ yields £4 9s. 9d.; Wandsworth 5% at 114½ gives a return of £4 7s. 4d.; and Newcastle 4% at 91 (on the local Exchange) yields nearly £4 8s.

The Directors of the South Suburban Gas Company are offering for sale by tender £300,000 4% perpetual preference stock at a minimum price of £101, and £100,000 4% perpetual debenture stock, to rank *pari passu* with the existing debenture stocks, at a minimum price of £103. The yields at these minimum prices are £3 19s. 2d. and £3 17s. 8d. respectively. The accounts for 1931 show that the net revenue available, after paying interest on the debenture stocks, was about four times the amount required to pay the interest on the preference stock, including the present issue, so that the new stock presents an attractive permanent investment. Tenders will be received up to noon on Monday, Nov. 14.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *Oct.* 31.

There is little change to report in the values of tar products, which are as follows:

Pitch is firm at 100s. per ton f.o.b.

Creosote is 3½d. to 5d. per gallon f.o.b., according to specification.

Refined tar is 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 7d.; pure benzole, about 1s. 11d.; 95/160 solvent naphtha, about 1s. 7½d.; and 90/140 pyridine bases, 3s. 9d. to 4s.—all per gallon naked at makers' works.

Tar and Tar Products in the Provinces.

Oct. 31.

The average prices of gas-works products during the week were: Gas-works tar, 33s. to 38s. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 5½d. to 5¾d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 4½d. Heavy naphtha, North, 10½d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2¼d. to 2¾d.; low gravity, 1¼d.; Scotland, 2¼d. to 2¾d. Heavy oils, in bulk, North, 4¾d. to 5¼d. Carbolic acid, 60's, 1s. 6¼d. to 1s. 7d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2¼d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Oct.* 29.

Business remains rather dull for prompt delivery, but considerable attention is now being devoted to the forward position.

Crude gas-works tar.—Actual value is 45s. to 50s. per ton *ex* works.

Pitch.—Value for export remains nominal at 85s. to 90s. per ton f.o.b. Glasgow. In the home market, quotations are round 90s. to 95s. per ton f.o.r.

Refined tar to Ministry of Transport Specification continues easy at 3¾d. to 4d. per gallon f.o.r. naked.

Creosote oil.—The market has turned dull, and to-day's values are easier. B.E.S.A. Specification is 3½d. to 3¾d. per gallon; low gravity, 3d. to 3¼d. per gallon; and neutral oil, 3¼d. to 3¾d. per gallon—all *ex* works in bulk.

Cresylic acid.—There is no change to report, supplies being plentiful with orders scarce. Pale, 97/99% is 11½d. to 1s. per gallon; dark, 97/99%, 10d. to 11d. per gallon; and pale, 99/100%, 1s. 2d. to 1s. 3d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha.—Value is steady at 4½d. to 5d. per gallon, according to quantity and quality.

Solvent naphtha.—90/160 grade is 1s. 2d. to 1s. 3d. per gallon, and 90/190 grade 11d. to 1s. per gallon.

Motor benzole.—There was little demand for available supplies, and price is unchanged at 1s. 4d. to 1s. 5d. per gallon f.o.r. in bulk.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time.

	s. d.		s. d.	
Crude benzole	0 10½	to	0 11	per gallon at works
Motor ,, ...	1 6½	,,	1 7	,, ,, ,,
Pure ,, ...	1 10	,,	1 11	,, ,, ,,

New Capital Issues.

Guildford Gas Light and Coke Company.—The tenders sent in for the issue of £30,000 5% preference stock in this Company amounted to a total of £116,705, and ranged from £114 down to the minimum of £106 per £100. The lowest accepted tender was at £110 per £100 worth of stock.

Mid-Southern Utility Company.—The result of the tenders for the stock issue of the Mid-Southern Utility Company (formerly the Aldershot Gas, Water, and District Lighting Company) resulted in applications for stock to the extent of £302,010. Tenders received were from £111 down to the minimum of £97 10s. Tenders have been allotted from £111 to £100 5s.

South Suburban Gas Company.—As mentioned in our Stock Market Report, the South Suburban Gas Company are making a new issue of £300,000 of 4% perpetual preference stock, at a minimum price of £101 per £100 of stock; and £100,000 of 4% perpetual debenture stock, at a minimum price of £103 per £100 of stock—tenders for both of which must be received not later than 12 o'clock noon on Monday, Nov. 14, 1932. A copy of the prospectus appears on another page of this issue of the "JOURNAL."

Trade Notes.

New Temperature Recorder.

The Nivex Instrument and Gauge Company, of 3, Furlong Road, Holloway Road, N. 7, have recently placed on the market a new temperature recorder for recording the temperature of hot water and steam pipes on heating apparatus. Its main advantage is that, instead of waiting until the room becomes too hot or too cold, the temperature can be regulated by keeping the pointer between pre-determined limits. Either Centigrade or Fahrenheit scale is available.

Metropolitan Gas Companies' Testings.

The Gas Referee's report on the official testings for the past quarter gives the following average calorific values for the gas supplied by the Metropolitan Companies named.

Commercial Gas Company.—501·5 B.Th.U. (declared calorific value, 500 B.Th.U.).

Gas Light and Coke Company.—501·8 B.Th.U. (declared calorific value, 500 B.Th.U.).

South Metropolitan Gas Company.—562·2 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—562·1 B.Th.U. (declared calorific value, 560 B.Th.U.).

Tottenham and District Gas Company.—500·7 B.Th.U. (declared calorific value, 500 B.Th.U.).

Wandsworth and District Gas Company.—502·4 B.Th.U. (declared calorific value, 500 B.Th.U.).

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Oct. 29. (Provincial Exchange Oct. 28.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Oct. 3	7⅞	7⅞	Alliance & Dublin Ord. ...	102—112	+2	109—111½
374,000	,,	July 4	4	4	Do. 4 p.c. Deb. ...	80—90	...	...
557,655	,,	Aug. 22	7	7	Barnet Ord. 7 p.c.	182—142	...	...
200,000	1	Oct. 17	1/9⅔	1/4⅓	Bombay, Ltd.	21/-—23/-*	...	22/-—22/6
177,780	Stk.	Aug. 22	9	9½	Bournemouth sliding scale	190—200	...	...
350,050	,,	,,	7	7	Do. 7 p.c. max. ...	145—155	...	149—150
439,160	,,	,,	6	6	Do. 6 p.c. Pref. ...	135—140	+7	135
50,000	,,	June 20	3	3	Do. 3 p.c. Deb. ...	75—80	...	76
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	100—105	+5	102½—102½
210,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	125—130	+5	...
357,900	,,	Aug. 22	7½	7½	Brighton, &c. 6 p.c. Con. ...	138—143	...	...
540,000	,,	,,	6⅔	6⅔	Do. 5 p.c. Con. ...	127—132	...	...
195,500	,,	,,	6	6	Do. 6 p.c. B Pref.	135—145	+10	140
1,287,500	,,	Aug. 8	5	5	Bristol 5 p.c. max.	108—109a	...	...
120,420	,,	June 20	4	4	Do. 1st 4 p.c. Deb. ...	94—96a	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	93—95a	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	115—120a	...	...
955,000	,,	Oct. 3	8	7	British Ord.	127—137	+2	132½—136½
100,000	,,	June 20	7	7	Do. 7 p.c. Pref.	140—150	+20	145
350,000	,,	—	—	—	Do. 5½ p.c. Pref. ...	107—112	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	90—95	+3	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	105—115	...	...
160,000	,,	July 4	5	5	Cambridge 5 p.c. Deb. ...	117—122	...	...
100,000	10	May 23	6	6	Cape Town, Ltd.	7½—8½	...	...
100,000	10	Apl. 29	4½	4½	Do. 4½ p.c. Pref. ...	6—7	...	...
150,000	Stk.	June 20	4½	4½	Do. 4½ p.c. Deb. ...	90—95	...	...
626,860	,,	Aug. 8	6	6	Cardiff Con. Ord.	102—107	...	...
237,860	,,	July 4	2½	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	,,	Aug. 8	6½	5	Chester 5 p.c. Ord.	91—96b	...	...
98,926	1	Oct. 17	2/-	2/-	Colombo, Ltd. Ord.... ...	25/-—30/-*	...	28/-
24,500	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref.	18/-—20/-*	...	...
609,204	1	Oct. 17	-/10·90	-/11·47	Colonial Gas Assn. Ltd. Ord.	10/-—15/-*	...	...
296,058	1	,,	1/2·54	1/2·80	Do. 8 p.c. Pref.	10/-—15/-*	...	...
1,843,830	Stk.	Aug. 8	5⅔	5	Commercial Ord.	102—107	...	105
476,000	,,	June 20	3	3	Do. 3 p.c. Deb. ...	74—79	...	76—78
220,272	,,	—	—	—	Do. 5 p.c. Deb. ...	118—123	...	...
807,560	,,	Aug. 8	7	7	Croydon sliding scale ...	137—142	...	...
469,590	,,	,,	5	5	Do. max. div.	95—100	...	...
500,000	,,	July 4	5	5	Do. 5 p.c. Deb.	120—125	...	...
542,270	,,	Aug. 8	10	7	Derby Con.	150—160e	+30	...
55,000	,,	July 4	4	4	Do. 4 p.c. Deb.	75—85c	...	...
209,000	,,	Sept. 5	5	5	East Hull Ord. 5 p.c. ...	95—100	...	...
179,500	,,	Aug. 22	5⅔	6	East Surrey Ord. 5 p.c. ...	108—118	...	...
155,019	,,	June 20	5	5	Do. 5 p.c. Deb. ...	117—122	...	119½—121
1,002,180	,,	Sept. 19	†6½	†5	European, Ltd.	122—127	...	120—125
19,405,992	,,	Aug. 8	5⅝	5⅔	Gas Light & Coke 4 p.c. Ord.	24/—26/-f	...	24/6—25/1½
2,600,000	,,	,,	3½	3⅝	Do. 3½ p.c. max.	78—83	...	81⅔—83
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	100—103	...	100⅝—102⅔
6,102,497	,,	June 20	3	3	Do. 3 p.c. Con. Deb. ...	80—83	...	80½—82
3,643,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	110—115	...	...
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	110—114	...	111—112½
264,911	,,	Aug. 22	—	6	Harrogate New Cons. ...	104—109	...	...
92,500	,,	Aug. 22	7	7	Hastings & St. L. 5 p.c. Conv.	130—140	...	136—136⅔
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	100—105	...	...
70,000	10	Oct. 17	†10	†10	Hongkong & China, Ltd. ...	9½—10½*	...	...
218,200	Stk.	Aug. 22	6	6	Hornsey Con. 3½ p.c. ...	112—117	...	...
5,600,000	,,	June 6	15	14	Imperial Continental Cap.	195—205	...	197—204
228,180	,,	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb.	90—95	...	...
235,242	,,	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	142—152	...	...
2,145,907	,,	Aug. 22	6	6	Liverpool 5 p.c. Ord. ...	113½—115½b	+½	...
245,500	,,	June 20	5	5	Do. 5 p.c. Red. Pref. ...	100—110b	...	...
306,088	,,	July 15	4	4	Do. 4 p.c. Deb. ...	94—99b	...	...
165,786	,,	Sept. 5	10	8	Maidstone 5 p.c. Cap. ...	155—165	...	165½—168
56,176	,,	June 20	3	3	Do. 3 p.c. Deb. ...	69—74	...	...
75,000	5	June 20	†10	†10	Malta & Mediterranean ...	7½—8½	...	...
892,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	97—102	...	...
171,978	Stk.	Sept. 5	5	5	M. S. Utility "C." Cons. ...	95—100	+3	...
718,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	90—95	+8	85—86
112,126	,,	July 4	4	4	Do. 4 p.c. Deb. ...	95—100	+5	...
148,955	,,	,,	5	5	Do. 5 p.c. Deb. ...	115—120	+10	...
675,000	,,	21 May '31	†6	†6	Montevideo, Ltd.	35—45	...	...
2,061,315	,,	Aug. 8	5⅔	5	Newcastle & Gateshead Con.	21/-—22/-d/	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	90½—91½d	...	...
691,705	,,	June 20	3½	3½	Do. 3½ p.c. Deb. ...	89—91d	...	...
277,285	,,	Apl. 29	5	5	Do. 5 p.c. Deb. '43...	105—107d	...	...
274,000	,,	Aug. 8	5	5	Newport (Mon.) 5 p.c. max.	91—93a	...	...
199,940	,,	Aug. 22	7½	7½	North Middlesex 6 p.c. Con.	135—145	...	...
396,160	,,	Aug. 8	5	5	Northampton 5 p.c. max. ...	96—101	...	...
300,000	,,	Apl. 18	9	7	Oriental, Ltd.	85—95	...	...
205,162	,,	June 20	8	8	Plym'th & Stonehouse 5 p.c.	142—152	...	...
504,416	,,	Aug. 22	8	8	Portsm'th Con. Stk. 4 p.c. Std.	142—152	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	97—102	...	...
114,000	,,	Aug. 8	5	5	Preston 5 p.c. Pref.	105—110	+5	...
686,312	,,	July 18	4	4	Primitiva 4 p.c. Rd. Db. 1911	77—82	+2	80
389,813	,,	June 20	4	4	Do. 4 p.c. Cons. Deb.	77—82	+1	...
150,000	10	Sept. 19	6	6	San Paulo 6 p.c. Pref. ...	6⅔—7⅓*	...	...
1,786,968	Stk.	Sept. 5	6	6	Sheffield Cons.	110—114a	...	...
95,000	,,	July 18	4	4	Do. 4 p.c. Deb.	92—96a	...	...
133,201	,,	Sept. 5	5	8½	Shrewsbury 5 p.c. Ord. ...	113—118	...	117—117½
90,000	10	June 6	15	15	South African	4—6	...	...
6,709,895	Stk.	Aug. 8	7	5	South Met. Ord.	118—123	+1	120—124
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	139—144	+1	140—143
1,895,445	,,	July 4	3	3	Do. 3 p.c. Deb. ...	80—83	+1	81⅔—82½
1,000,000	,,	July 18	4	5	Do. 5 p.c. Red. Deb.	109—114	...	114
91,500	,,	Aug. 8	8½	8½	South Shields Con.	134—136d	...	...
1,548,795	,,	Aug. 8	6	6	South Suburban Ord. 5 p.c.	113—118	...	...
300,000	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
668,887	,,	June 20	5	5	Do. 5 p.c. Deb.	120—125	...	122½—124½
647,740	,,	Aug. 22	5	5	Southampt'n Ord. 5 p.c. max.	93—98	...	...
121,275	,,	June 20	4	4	Do. 4 p.c. Deb.	95—100	...	...
350,000	,,	Aug. 8	—	9/-	Swansea 6½ p.c. Red. Pref.	109—112	...	...
200,000	,,	June 20	6½	6½	Do. 6½ p.c. Red. Deb.	105—110	...	...
1,976,490	,,	Aug. 8	6⅔	6⅔	Tottenham and District Ord.	130—135	...	132
300,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	120—125	+5	123—125
199,005	,,	June 20	4	4	Do. 4 p.c. Deb. ...	95—100	...	...
85,701	,,	Sept. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	67—72	...	...
346,059	,,	Aug. 22	7	7	Uxbridge, &c., 5 p.ct. ...	130—140	...	...
88,880	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
1,322,220	,,	July 4	7	7	Wandsworth Consolidated	130—140	...	140
971,373	,,	,,	5	5	Do. 5 p.c. Pref.	112—117	...	114—116½
1,167,964	,,	June 20	5	5	Do. 5 p.c. Deb.	120—125	...	123—125
158,400	,,	Aug. 22	6g	5	Winchester W.& G. 5p.c. Con.	98—103	...	...

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. f.—The quotation is per £1 of stock. g Paid £3. including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

BUFFALO INJECTOR
(British Made) **CLASS A**
— FOR —
Hot or Cold Water and long lifts.

SEND FOR LIST.

CREEN & BOULDING, LTD.
162a, Dalston Lane, LONDON, E. 8.

CAST IRON PIPES

FOR

GAS, WATER, & STEAM

1¼in. to 12in. BORE.

THOS. ALLAN & SONS, LTD.,
Bonlea Foundry,
THORNABY-ON-TEES.

Telegrams: "BONLEA, THORNABY-ON-TEES."
Telephone No.: STOCKTON 66121 (Two lines).

(This announcement is inserted gratuitously.)

PETER—WITH ONE EXCEPTION

With one exception Peter is an ordinary little fellow. Chubby, likeable, just five-and-a-half, full of life and fun and on occasions—be it admitted—of naughtiness.

Just now Peter's rather important, for this is his first term at school, and he's grappling with the intricacies of "A B C" and "Twice Two": difficult subjects to all men of five-and-a-half, but even more difficult in Peter's case because—bad luck—he's totally blind. That's his One Exception.

Peter learns reading, writing, and 'rithmetic through the medium of "Braille"—dull stuff compared with the coloured picture books of most five-and-a-halfs. However, he's a stout lad is Peter, and he's making great progress.

Would you like to know more about him? How, in spite of his "One Exception," he is being educated, and, when older, technically trained and usefully employed.

There is a long waiting list of "Peters" throughout the British Isles, for whom training and accommodation must be provided in the immediate future.

Will you help with a donation or annual subscription? Any sum, large or small, will be gratefully received.

Here's a suggestion. Your eyesight is worth 3d. a year to you. Send Peter and his handicapped pals 3d. for every year you've had it. Now, please, in case it slips your memory. Good idea!

THE CHAIRMAN,
SCHOOL FOR THE BLIND
(Founded 1838).
Swiss Cottage, LONDON, N.W.3

BY ORDER OF THE DIRECTORS.

NEW ISSUE OF 4% PERPETUAL PREFERENCE STOCK

and

4% PERPETUAL DEBENTURE STOCK.

SOUTH SUBURBAN GAS COMPANY.

Incorporated by Act of Parliament, 1858, as the Crystal Palace District Gas Company.

Directors.
CHARLES CARPENTER, D.Sc., *Chairman.*
BENJAMIN R. GREEN, *Deputy Chairman.*
HAROLD GUNDRY.
FRANK BUSH.
FRANK H. JONES, M.Inst.C.E.
ARTHUR M. PADDON, M.Inst.C.E.
CHARLES J. CARTER.
ALEXANDER ROSS.

General Manager.
WILFRID WASTELL, F.C.I.S.

Engineers.
VERNON SIMMONDS (*Works*).
JOHN A. GOULD, M.Inst.Gas E. (*District*).

Secretary.
T. BROWN.

Brokers
SEYMOUR, PIERCE & CO.

Bankers.
BARCLAYS BANK, LIMITED.

PARTICULARS AND CONDITIONS OF SALE BY TENDER OF

£300,000 4 per cent. PERPETUAL PREFERENCE STOCK,

Minimum price £101 per £100 Stock,

to rank after the Debenture Stocks,

AND

£100,000 4 per cent. PERPETUAL DEBENTURE STOCK,

Minimum price £103 per £100 Stock,

to rank *pari passu* with the existing Debenture Stocks of the Company.

THE DIRECTORS OF THE SOUTH SUBURBAN GAS COMPANY are prepared to receive on or before the 14th day of November, 1932, sealed tenders for £300,000 4 per cent. Perpetual Preference Stock, and £100,000 4 per cent. Perpetual Debenture Stock.

The Stock may be tendered for in amounts of £10 or multiples thereof.

Tenders must be on the forms accompanying the Prospectus. No tender will be considered at less than the minimum prices stated above.

A deposit of 10 per cent. of the nominal amount of the Stock tendered for must accompany the tender, the balance of the purchase money of all Stock allotted to be paid to the Company's Bankers, BARCLAYS BANK, LTD., at their Head Office, or any of their Branches, on or before the 31st December, 1932.

Dividend on the Preference Stock and interest on the Debenture Stock will commence to accrue from the 1st January, 1933. The Stock of the Company is quoted in the Stock Exchange Official List, and application will be made for the inclusion of the present issue.

By the South Suburban Gas Act, 1932, the Sevenoaks and Tonbridge Gas Undertakings are transferred to the Company as at the end of the current year, when the area supplied by the Company will comprise 245 square miles, including parts of the Metropolitan Boroughs of Lewisham, Camberwell and Lambeth and of the County Borough of Croydon, and the whole of Beckenham, Penge, Bromley, Orpington, Chislehurst, The Crays, Sidcup, Bexley, etc., and the important industrial districts of Crayford, Dartford, Erith, Northfleet and Greenhithe.

The Company's area of supply adjoins that of the South Metropolitan Gas Company, which comprises the major part of the County of London South of the Thames, and with which Company it is associated. Under an agreement dated 28th January, 1927, the South Metropolitan Gas Company may purchase, at the average price received, up to five-twelfths of any Ordinary or Preference Capital issued by this Company.

The Company now ranks fourth amongst the Metropolitan and Suburban Gas Undertakings. The number of consumers continues to grow; while the rate of increase during the present year has been affected by the industrial depression, the sale of gas, in the past ten years, has increased by fifty-nine per cent., excluding areas taken over during that time.

The net revenue remaining after paying interest on the Debenture Stocks for the year 1931 was about four times the amount required to pay the dividend on the Preference Stocks, including the present issue.

The proceeds of the present issue are required for repayment of loan by the Company's Bankers, to meet the cost of mains, appliances, etc., necessitated by the continuing rapid development of the Company's business, and for general purposes.

Under a contract dated 21st October, 1932, between the Company and MESSRS. SEYMOUR, PIERCE & CO., the whole of the Stocks now offered have been underwritten for a commission of 1½ per cent.

The paid up Capital of the Company is as follows:

	£
5 per cent. Perpetual Preference Stock	300,000
5 ,, Ordinary Stock	1,543,795
5 ,, Perpetual Debenture Stock	868,837
6 ,, Redeemable Mortgage Debentures (January 1st, 1935)	6,600
	2,719,232
Premiums received on same	51,005
Total receipts to date	£2,770,237

and the balance of the authorized capital remaining to be issued totals £851,478.

The Reserve Fund on the 31st December, 1931, stood at £78,363 12s. 4d.

The Accounts of the Company are made up yearly to the 31st December; dividends on the Preference Stock will be payable half-yearly in March and August, and a full half year's dividend will be payable in August next.

The yield of the Preference Stock at various prices would be:

	£ s. d.
At 101	3 19 2
,, 102	3 18 5
,, 103	3 17 8
,, 104	3 16 11
,, 105	3 16 2
,, 106	3 15 6
,, 107	3 14 9
,, 108	3 14 1
,, 109	3 13 5
,, 110	3 12 9

and the yield of the Debenture Stock would be:

	£ s. d.
At 103	3 17 8
,, 104	3 16 11
,, 105	3 16 2
,, 106	3 15 6
,, 107	3 14 9
,, 108	3 14 1
,, 109	3 13 5
,, 110	3 12 9
,, 111	3 12 1
,, 112	3 11 5

If tenders are received for a larger amount of Stock than that proposed to be issued, tenders at the lowest price accepted will be subject to diminution.

All Stock allotted when fully paid will be registered in the Company's books, and certificates issued free of expense, in the name of the person tendering, or his or her nominee, after which it will be transferable by deed in the usual way.

If no allotment is made, the deposit will be returned in full; and in case of partial allotment, the balance of the deposit will be applied to the balance of the purchase money due. Payment in full may be made on the 8th or 22nd December, 1932, when discount at the rate of 2½ per cent. per annum will be allowed.

Interest at the rate of 10 per cent. per annum will be chargeable upon any balances of purchase money unpaid by the 31st December, 1932.

Tenders must be delivered by or before 12 o'clock noon on Monday, 14th November, 1932.

Copies of this Prospectus may be obtained at the Head Office of the Company, Lower Sydenham, S.E. 26, at any of the Showrooms as under:—

97, SYDENHAM ROAD, SYDENHAM, S.E. 26
2, DARTMOUTH ROAD, FOREST HILL, S.E. 23
53, WESTOW HILL, UPPER NORWOOD, S.E. 19
11, HIGH STREET, SOUTH NORWOOD, S.E. 25
24, HIGH STREET, BECKENHAM, KENT
156, HIGH STREET, BROMLEY, KENT
143, HIGH STREET, ORPINGTON, KENT
86A, STATION ROAD, SIDCUP, KENT
16, CENTRAL PARADE, WEST WICKHAM, KENT
14, PIER ROAD, ERITH, KENT
4, HYTHE STREET, DARTFORD, KENT
67, HIGH STREET, NORTHFLEET, KENT
177, BROADWAY, BEXLEYHEATH, KENT

at the Head Office or any Branch of BARCLAYS BANK, LTD., or from MESSRS. SEYMOUR, PIERCE & CO., 5, Lothbury, E.C. 2.

By Order of the Board,
T. BROWN,
Secretary.

HEAD OFFICE OF THE COMPANY,
LOWER SYDENHAM, S.E. 26.
31st October, 1932.